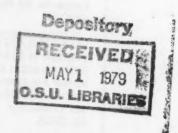
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SWATERRESOURCES ABSTRACTS

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VOLUME 12, NUMBER 6 MARCH 15, 1979

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior



VOLUME 12, NUMBER 6 MARCH 15, 1979

W79-02501 -- W79-03000

Secretary of the U.S. Department of the Interior has demined that the publication of the periodical is necessary in the insaction of the public business required by law of this Depart-

ment. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1983.

SELECTED WATER RESOURCES

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wild-life, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.



VOLUME 12, NUMBER 6 MARCH 15, 1979

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the Water Resources Thesaurus. Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstract-

ing, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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under the Water to Water Inc. I Water Russarch ressurce agencies	05	WATER QUALITY MANAGEMENT AND PROTECTION Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.
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	10	SCIENTIFIC AND TECHNICAL INFORMATION Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

MULTIMODE MODELING OF THE WATER

MOLECULE,
Science Applications, Inc., La Jolla, CA.
D. Rogovin, T. Stephens, and W. Wilson.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A047 397,
Price codes: A05 in paper copy, A01 in microfiche.
Report AFWL-TR-253, Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico,
Aug 1977. 71 p, 5 fig, 22 tab, 11 ref. F29601-75-C-

Descriptors: *Water vapor, *Molecular structure, *Mathematical models, *Model studies, Water, Water structure, Attenuation, Light, Physical properties, Chemical properties, Atmosphere, Rotation-vibration energy levels.

This report presented three approaches to multimode modeling water vapor. These are: (1) A correlated bender approach that treats fluctuations in the bend angle as well as correlations of the bending mode with the OH stretch mode. Only a single 'effective' nuclear coordinate is used. (2) A model that treats all three vibrational degrees of freedom, mode-mode coupling as well as molecular rotation. In addition, the effects of centrifugal distortion are included in a nonperturbative manner. (3) A phenomenological approach based on the concept of fitting the A, B, and C rotation matrices, both diagonal components, to the rotation-vibration energy levels. This approach, although phenomenological in nature, is predictive. (Sims-ISWS)

1B. Aqueous Solutions and Suspensions

OPTICAL CONSTANTS IN THE INFRARED FOR K2SO4, NH4H2PO4 AND H2SO4 IN WATER, Missouri Univ.-Kansas City. Dept. of Physics. For primary bibliographic entry see Field 2K. W79-02879

2. WATER CYCLE

2A. General

Se

LINEAR GROUND-WATER FLOW, FLOOD-WAVE RESPONSE PROGRAM FOR PROGRAMMABLE CALCULATORS, Geological Survey, Louisville, KY. Water Re-

For primary bibliographic entry see Field 2F. W79-02651

A RAINFALL-RUNOFF MODELING PROCE-DURE FOR IMPROVING ESTIMATES OF T-YEAR (ANNUAL) FLOODS FOR SMALL DRAINAGE BASINS,

Geological Survey, Lakewood, CO. Water Re-For primary bibliographic entry see Field 2E. W79-02652

WATER WETLANDS, AND WOOD STORKS IN SOUTHWEST FLORIDA, Florida Univ., Gainesville, Dept. of Environmental Engineering Sciences. For primary bibliographic entry see Field 2H. W79-02677

APPLICATION OF COMPUTER WAVEFORM MATCHING TO MONITORING OF HYDROLOGIC SYSTEM PARAMETERS, Nebraska Univ., Lincoln.

For primary bibliographic entry see Field 7C. W79-02836

WATER BALANCE OF ASIA, (IN RUSSIAN), Akademiya Nauk SSSR Moscow. Inst. Geografii. G. M. Nikolaeva, and G. M. Chernogaeva. Sovietskoye Radio, Moscow (USSR), 1977. 115 p, 22 fig. 15 tab, 186 ref, 1 append.

Descriptors: *Water balance, *Asia, Water resources, Hydrologic cycle, Precipitation(Atmospheric), Runoff, Surface runoff, Subsurface runoff, Groundwater, Groundwater movement, Evaporation, Rainfall, Snowfall, Rivers, Distribution patterns, Mapping, Hydrology, *USSR.

This monograph was one of the issues in the series of publications prepared at the department of Hydrology, Institute of Geography, Academy of Sciences of the USSR. The work was based on the differentiated method of studying water balance. Besides defining precipitation, river runoff, and evaporation, the method discovered the land phase evaporation, the method discovered the land phase of the hydrologic cycle. Water balance elements, such as precipitation, total runoff, underground runoff, surface runoff, evaporation, and total moistening of an area. were determined for 220 river basins on the territory of Asia outside the USSR and for 600 basins of the Asian part of the USSR. and for 600 designs of the Assan part of the Costs. For hydrologically unstudied areas, water balance elements were estimated on the basis of a series of interpolation relations between precipitation, total elements were estimated on the basis of a series of interpolation relations between precipitation, total river runoff, and total moistening of the area. These relations are zonal by their nature since they reflect the dependence of the water balance elements on the natural environment in which their formation occurs. One of the major results of the study was the compilation of generalized maps on the water balance elements. The maps made it possible to reveal regularities and peculiarities of water balance distribution over the area of Asia and to assess chief water sources involving countries hydrologically poorly studied. Asia is the part of the world where the whole variety of the physiogeographic conditions of earth manifests itself, from tundra in the far north to the equatorial for each of the water balance maps, compiled for each of the water balance elements, made it possible, with the help of planimetry, to estimate river and surface flood runoff and the most regulated groundwater runoff drained by rivers. Tables presented the results of the estimates.

W79-02866

CHARACTERISTICS AND FILTERING OF NOISE IN LINEAR HYDROLOGICAL SYS-

TEMS, Purdue Univ., Lafayette, IN. Water Resources Research Center.

For primary bibliographic entry see Field 7C. W79-02914

2B. Precipitation

ACCURACY OF CANADIAN SNOW GAGE MEASUREMENTS,

Atmospheric Environment Service, Downsview (Ontario).

Onland, S. E. Goodison.

Journal of Applied Meteorology, Vol. 17, No. 10, p 1542-1548, October 1978. 5 fig, 17 ref.

Descriptors: "Snowfall, "Measurement, "Precipita-tion gages, "Canada, Snow, Precipitation(Atmospheric), Rain gages, On-site in-vestigations, Data collections, Regression analysis, Data processing, Winds, Snow cover, Melt water, Snow melt, Snow surveys, Meteorology.

A field investigation to assess the accuracy and comparability of precipitation gage measurements of snowfall in Canada was initiated in 1973. The MSC Nipher shielded snow gage (Canadian standard gage), the Universal (Belfort) precipitation gage, and the Fischer and Porter precipitation gage were tested at open and sheltered sites. Shielded and unshielded pairs of gages were com-

pared at an open site. Gage catch was related to 'ground true' snowfall water equivalent as measured on snow boards in a sheltered site. Each gage tested had unique performance characteristics. Curves of gage catch to ground true as a function of wind speed were given. The catch ratio of the Universal gage is higher than the Fischer and Porter for similar shielding and environmental conditions. The MSC Nipher shielded gage exhibits a superior catch efficiency. At lower wind speeds, this gage can overcatch. For winds up to 5.5 m/s, the catch of the Nipher gage is within 10% of true. A mean correction of 0.15 mm for retention loss is required for this non-recording gage. Reasons for A mean correction of 0.15 mm for retention loss is required for this non-recording gage. Reasons for the efficiency of this gage were suggested. Users of gage measurements of snowfall water equivalent in Canada must consider the method of measurement before analyzing or correcting snowfall data. (Sims-ISWS) W79-02681

WHAT THE DESIGN ENGINEER NEEDS FROM THE HYDROMETEOROLOGIST. For primary bibliographic entry see Field 7C. W79-02683 CH2M Hill, San Francisco, CA.

WEATHER MODIFICATION ACTIVITIES IN TEXAS, 1974-77.
Texas Dept. of Water Resources, Austin. Weather Modification and Technology Section.

For primary bibliographic entry see Field 3B.

CLIMATE: WET COASTAL ECOSYSTEMS, Stuttgart Univ. (Germany F.R.). Botanisches Inst.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 61-67. 7 fig. 14 ref.

Descriptors: Salt marshes, *Mangrove swamps, *Climates, Wetlands, Marshes, Coastal marshes, Marsh plants, Geographical regions, Ecological distribution, Temperature, Rainfall.

Climate is of significance both for azonal vegeta-tion of salt marshes and mangrove swamps, species distribution on a large scale, and patterns on a small scale. Mangrove swamps occur only in the tropical region, approximately between 32 degree N and 38 degree S due to mangrove's sensitivity to frost. Temperature requirements of the various mangrove swamps are not the same; however, even in a continuously humid climate the number of species decreases with increased distance from the Equator. The lack of mangroves along sections of the west coasts of North American and Africa is related to low water temperatures of cold ocean currents which wash their shores. Rainfall conditions can affect zonation with the tidal region by its effect upon salinity. Salt marshes in the climate zones outside the tropics can locally show such a high concentration of salt in the soil that areas without vegetation can occur. Marshes also show an impoverishment of species with increasing latian impoverishment of species with increasing latitude and decreasing temperature. Along the sea coasts from the entire tropics into the Artic and Antarctic salt marshes ane composed exclusively of herbaceous halophytes. Only in the areas without cold winter, but isolated cold snaps, do some partly liquifed shrubs occur. (See also W79-02762) (Steiner-Mass) W79-02765

DEW-MONITORING NETWORK IN THE SOUTHEAST,

National Weather Service, Auburn, AL. Environ-mental Studies Service Center. For primary bibliographic entry see Field 7B.

W79-02853

WATER BALANCE OF ASIA, (IN RUSSIAN), Akademiya Nauk SSSR Moscow. Inst. Geografii. For primary bibliographic entry see Field 2A. W79-02866

Group 2B-Precipitation

PRINCIPAL COMPONENTS ANALYSIS OF GLACIER-CLIMATOLOGICAL DATA FOR SENTINEL GLACIER, BRITISH COLUMBIA, Department of Fisheries and Environment, Ottawa (Ontaria). Water Resources Branch. For primary bibliographic entry see Field 2C.

NORMAL PRECIPITATION IN WEST VIRGIN-

IA, West Virginia Univ., Morgantown. Coll. of Agriculture and Forestry.

R. Lee, S. Tajchman, D. G. Boyer, and E. W.

West Virginia Agriculture and Forestry, Vol. 7, No. 2, p 12-18, December 1977. 10 fig, 4 tab, 3 ref. OWRT A-023-WVA(4), 14-34-0001-6051.

Descriptors: *Precipitation(Atmospheric), *West Virginia, Climatology, Dry seasons, Isohyets, Rainfall, Rainfall disposition, Snowfall, Wet sea-

West Virginia lies near the average path of west-to-east cyclonic migrations that produce extensive activity during the colder months. Because of the topography, the climatologic diversification is exceptional. 'Normal' monthly and annual precipitation are defined, for purposes of this report, as mean values for the 30-year priod, 1947-76. Extensive tables, graphs, and illustrations, show the characteristics of normal and extreme precipitation in the state. Normal annual precipitation at individual stations ranges from about 32 to about 67 inches. County means range from about 34 to more than 56 inches. Normal annual precipitation for the entire state (based on a 66-station average) is 43.3 inches, but a more realistic average is 44.8, and the true normal precipitation must be about 47 inches. inches, but a more realistic average is 44.8, and the true normal precipitation must be about 47 inches. Precipitation is mostly rain. Normal annual snow-fall depths range from about 15 to more than 150 inches, a maximum of about 25 percent of the normal precipitation. (Dodson-West Virginia) W79_02984

2C. Snow, Ice, and Frost

A BIOLOGIST LOOKS AT OIL IN THE SEA, Dalhouse Univ., Halifax (Nova Scotia). Dept. of Biology.

For primary bibliographic entry see Field 5G.

ACCURACY OF CANADIAN SNOW GAGE MEASUREMENTS.

Atmospheric Environment Service, Downsview

For primary bibliographic entry see Field 2B. W79-02681

EFFECT OF SUBZERO TEMPERATURE IN CONCRETE ON THE NATURE OF OPERATIONS OF HIGH CONCRETE DAMS, For primary bibliographic entry see Field 8F.

CONCRETE PLACING TECHNIQUES USED DURING THE CONSTRUCTION OF THE KRASNOIARSK HYDROELECTRIC POWER

For primary bibliographic entry see Field 8F. W79-02691

COEFFICIENT OF LINEAR EXPANSION OF MASSIVE CONCRETE AT A NEGATIVE TEM-

For primary bibliographic entry see Field 8F. W79-02692

SPECIFIC FEATURES OF CONSTRUCTION OF THAWED SOIL DAMS IN SEVERE CLIMATE CONDITIONS,

All-Union Designing, Surveying and Scientific Re-search Inst. Hydroproject, Moscow (USSR).

For primary bibliographic entry see Field 8D. W79-02693

THERMAL REGIME OF EARTH-ROCK DAMS CONSTRUCTED IN THE FAR NORTH, Vsesoyuznyi Nauchno-Issledovatelskii Inst. Gidrotekhniki, Leningrad (USSR). For primary bibliographic entry see Field 8D. W79-02694

FUNDAMENTALS OF CONSTRUCTING FROZEN TYPE EARTH DAMS IN THE

FROZEN TYPE EARTH DAMS IN THE ARCTIC, All-Union Designing, Surveying and Scientific Re-search Inst. Hydroproject, Moscow (USSR). For primary bibliographic entry see Field 8D. W79-02695

EVALUATION OF STABILITY OF EARTH-FILL DAM BASED ON STRENGTH OF FROZEN ZONES OF ITS PROFILE, For primary bibliographic entry see Field 8D. W79-02696

CONSTRUCTING CONCRETE DAMS IN RE-GIONS WITH SUBZERO AVERAGE YEARLY TEMPERATURE,

For primary bibliographic entry see Field 8F. W79-02697

STUDIES OF NONSTATIONARY TEMPERA-TURE REGIME OF FROZEN DAMS MADE OF LOCAL MATERIALS ON PERMAFROST FOUNDATIONS.

For primary bibliographic entry see Field 8D. W79-02698

INVESTIGATION OF SLUMPING FAILURE IN AN EARTH DAM ABUTMENT AT KOTZEBUE, ALASKA,

Cold Regions Research and Engineering Lab., Fairbanks, AK. Alaskan Projects Office. For primary bibliographic entry see Field 8D. W79-02702

THE ROLE OF ICE AND SNOW IN LAKE HEAT BUDGETS.

Trent Univ., Peterborough (Ontario). Dept. of Geography. For primary bibliographic entry see Field 2H. W79-02844

A NEW METHOD FOR COLLECTING WATER SAMPLES FROM BENEATH THE ICE, Queen's Univ., Kingston (Ontario). Dept. of Geo-For primary bibliographic entry see Field 7B. W79-02845

PREFERRED CRYSTAL ORIENTATIONS IN THE FAST ICE ALONG THE MARGINS OF THE ARCTIC OCEAN,

Army Terrestrial Sciences Center, Hanover, NH. W. F. Weeks, and A. J. Gow. Journal of Geophysical Research, Vol. 83, No. C10, p 5105-5121, October 20, 1978. 15 fig, 2 tab, 62 ref.

Descriptors: "Sea ice, "Ice, "Arctic, "Coasts,
"Arctic Ocean, On-site investigations, On-site data
collections, Crystals, Crystal growth, Anisotropy,
Ice cover, Cold regions, Islands, Oceans, Ice-water
interfaces, Crystal orientations, Crystal alignments.

Field observations of the growth fabrics of the fast and near-fast ice along the coasts of the Beaufort and Chukchi seas showed that at depths of more than 60 cm below the upper ice surface the sea ice crystals show striking alignments within the horizontal plane. At one site, this alignment was well developed at a depth of 15 cm, and in all cases the degree of preferred orientation increased with depth. In general, the c axes of the crystals were

aligned roughly E-W parallel to the coast. In the vicinity of islands, alignment roughly paralleled the outlines of the islands, and in narrow passes between islands the alignment paralleled the channel. These observations, as well as similar observations made in the Kara Sea, can be explained if it is assumed that the c axes of the crystals are aligned parallel to the 'long-term' current direction at the sea ice-seawater inteface. The alignments are believed to be the result of geometric selection among the growing crystals, the most favored orientation being that in which the current flows normal to the (0001) plates of ice that make up the dendritic ice/water interface characteristic of sea ice. It was hypothesized that current flow in this direction reduces the thickness of the solute boundary layer as well as the salinity in the liquid at the interface. This lowered salinity allows crystals in the favored orientations to extend farther into the melt than neighboring crystals with less favored orientations. In addition, the current tends to induce a continuous flux of supercooled seawater against the sides of the crystals that extend ahead of the interface. This favors their lateral growth. The aligned crystal aggregate that forms have he overall characteristics of a single forms have been all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of a single forms have a single all characteristics of extend ahead of the interface. This favors their lateral growth. The aligned crystal aggregate that forms has the overall characteristics of a single crystal. The development of such crystal alignents results in pronounced anisotropy in the mechanical, thermal, and electrical properties of fast ice. It was suggested that such crystal orientations can be used as an aid in determining current patterns in perennially ice-covered areas such as the Canadian ARchipelago. (Sims-ISWS) W79-02850

SELECTED WATER

ANALYTICAL COMPUTATION OF THE THREE-DIMENSIONAL STEADY-STATE TEMPERATURE CONDITION OF A DAM, For primary bibliographic entry see Field 8D. W79-02856

DAM OF THE ANADYRSK THERMAL ELEC-TRIC POWER STATION, For primary bibliographic entry see Field 8D. W79-02862

DESIGNING CONCRETE DAMS FOR ESPE-CIALLY HARSH CLIMATIC CONDITIONS, All-Union Designing, Surveying and Scientific Re-search Inst., Hydroproject, Leningrad (USSR). For primary bibliographic entry see Field 8F. W79-02864.

AN INVESTIGATION OF ICE FORCES ON VERTICAL STRUCTURES,

Iowa Univ., Iowa City. Inst. of Hydraulic Re-

search.
K. Hirayama, J. Schwarz, and H-C. Wu.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A017 879,
Price codes: A08 in paper copy, A01 in microfiche.
IIHR Report No. 158, June 1974. 164 p., 46 fig. 13
tab, 57 ref, 1 append. GK-35918X, CRREL DA-ENG-27021-72-G36.

Descriptors: *Ice, *Ice loads, *Structures, *Laboratory tests, *Model studies, Strength, Compressive strength, Tensile strength, Shear strength, Sea ice, Ice cover, Piles(Foundations), Bearing piles, Offshore platforms, Bridges, Cold regions, Mathematical models, Mechanical properties, *USSR,

Ice forces are the principal concern in designing offshore structures such as drilling platforms, transloading points, or bridge piers in arctic regions. Although some results have been obtained by field measurements in recent years, there are still significant gaps in the knowledge of ice forces on structures. In order to fill some of these gaps, the Iowa Institute of Hydraulic Research has undertaken model studies on the investigation of ice forces on vertical piles. Model techniques for the study of icebreaking phenomena have been developed, and the similarity between the model indications and prototype conditions has been demonstrated. Tests on the relationships between ice forces (ice strength) and pile diameter, between ice Ice forces are the principal concern in designing

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thickness and relative velocity (strain rate), and between ice and structure have been completed. The experimental results were explained satisfactorily by a theoretical approach, and the combination of these relationships led to a basic empirical formula for the calculation of the maximum penetration strength for a circular pile, which agrees with available field measurements and also in part with model investigations in Russia. The suggested formula was modified for application to different structural shapes and degree of contact between ice and structure as well as for application to the indentation case of pile-ice interaction. Further studies are necessary to investigate the effect of ice temperature, scale effects, and the influence of salinity on the ice forces on structures. (Sims-ISWS) W79-02865

CRYOPEDOLOGICAL RESEARCH IN THE CONSTRUCTION OF DAMS UNDER SEVERE CLIMATIC CONDITIONS, Kuybyshevskii Inzhenero-Stroitelnyi Inst. (USSR). Dept. of Hydraulic Engineering. For primary bibliographic entry see Field 8D. W79-02867

DAM DESIGN AND CONSTRUCTION IN THE USSR'S NORTH AND SIBERIA, All-Union Designing, Surveying and Scientific Research Inst., Hydroproject, Leningrad (USSR). For primary bibliographic entry see Field 8D. W79-02868

RECOMMENDED PRACTICE FOR THE DESIGN AND CONSTRUCTION OF EARTH DAMS FOR INDUSTRIAL AND POTABLE WATER SUPPLY IN THE FAR NORTH AND PERMAFROST AREAS. For primary bibliographic entry see Field 8D. W79-02871

FATE AND EFFECTS OF CRUDE OIL SPILLED ON PERMAFROST TERRAIN. FIRST YEAR PROGRESS REPORT,
Army terrestrial Sciences Center, Hanover, NH. For primary bibliographic entry see Field 5B. W79-02902

GLACIER SURVEYS IN ALBERTA - 1975. Department of Fisheries and Environment, Ottawa (Ontario). Water Resources Directorate.

I. A. Reid, J. O. G. Charbonneau, and L. A.

Report Series No. 60, 1978, 17 p., 8 fig., 4 maps, 9

Descriptors: *Glaciers, *Surveys, *Maps, *Mapping, *Volumetric analysis, Water resources, Streamflow, *Canada, *Alberta, *Athabasca glacier, *Saskatchewan glacier, Triangulation sta-

Glaciers act as natural regulators, storing water in winter and releasing it in summer. To gain some understanding of this phenomenon and the contribution which glaciers make to streamflow, the predecessors of the Water Survey of Canada began glacier surveys in 1945. The earlier surveys offered some clue to the role of the glacier, but the data collected were not sufficient to provide the overall picture. Following adoption of photogrammetric survey techniques, however, the glacier surveys have evolved to the extent that it is now feasible to produce a series of maps from which the linear, areal, directional and volumetric changes can be determined. The surveys have revealed that the glaciers, in general, are becoming smaller in size; hence the regulating effect on streamflow is diminishing. (WATDOC)

PRINCIPAL COMPONENTS ANALYSIS OF GLACIER-CLIMATOLOGICAL DATA FOR SENTINEL GLACIER, BRITISH COLUMBIA, Department of Fisheries and Environment, Ottawa

(Ontaria). Water Resources Branch. S. Fogarasi, and O. Mokievsky-Zubok. Scientific Series No. 95, 1978. 9 p, 2 fig, 10 ref, 9

Descriptors: *Climatology, Analysis, *Data collections, *Glaciers, *Correlation analysis, Variability, Weather, Runoff, *Canada, *Sentinel Glacier, *British Columbia, *Components loadings.

Multivariate analysis is being carried out on glacier-climatological data in two stages. This paper describes the first stage, which is an application of principal components technique to the available data. The multicollinear climatological variables are transformed into orthonormal principal components. The characteristics and the interpretation of these principal components are described. Data transformations and the ensuing results are explained. The transformed new variables, the component vectors, are interpreted in terms of weather types. Recommendations are given for the second types. Recommendations are given for the second stage of the analysis, which is an application of multiple regression on principal components aimed at the estimation of runoff. (WATDOC) W/79_02927

A MODEL OF STAND PHOTOSYNTHESIS FOR THE WET MEADOW TUNDRA AT BARROW, ALASKA, San Diego State Univ., CA. Dept. of Biology. For primary bibliographic entry see Field 2I. W79-02946

NUTRIENT LIMITATIONS TO PLANT PRO-DUCTION IN TWO TUNDRA COMMUNITIES, Alberta Univ., Edmonton. Dept. of Botany. For primary bibliographic entry see Field 21. W79-02947

2D. Evaporation and Transpiration

IRRIGATION OF URBAN LAWNS, Colorado State Univ., Fr. Collins. Dept. of Agricultural and Chemical Engineering. For primary bibliographic entry see Field 3D. W79-02832

ISOTOPE HYDROLOGY OF INLAND SABK-HAS IN THE BARDAWIL AREA, SINAI, Weizmann Inst. of Science, Rehovot (Israel). Dept. of Research. For primary bibliographic entry see Field 2H. W79-02841

RESISTANCES TO WATER TRANSPORT IN RICE PLANTS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India).
For primary bibliographic entry see Field 21.
W79-02986

THE RECOVERY OF LEAF WATER POTENTIAL, TRANSPIRATION, AND PHOTOSYNTHESIS OF COTTON DURING IRRIGATION CYCLES, Volcani Inst. of Agricultural Research, Bet-Dagan

(Israel).

H. Bielorai, and P. A. M. Hopmans.
Agronomy Journal, Vol. 67, No. 5, p 629-632.
September-October 1975. 6 fig, 1 tab, 11 ref.

Descriptors: *Moisture stress, *Transpiration, *Photosynthesis, *Cotton, Irrigation, Irrigation effects, Crop response, Crop production, Soil water, Soil moisture, *Leaf water potential.

The ability of a plant to recover from temporary and/or prolonged stress and the rate of recovery are of great importance in crop production. However, the information available on this subject is relatively scarce. A study was conducted to eva-lute the recovery of irrigated cotton following soil moisture stress of various durations through the measurements of soil moisture stresss using (1) the

Streamflow and Runoff-Group 2E

soil-moisture retention function, leaf water potential, by pressure bomb, and (2) leaf diffusion resistance by diffusive resistance portion of the solution of

2E. Streamflow and Runoff

THE DEVELOPMENT OF FLOOD-POTEN-TIAL INDEX MAPS FOR PENNSYLVANIA, Pennsylvania State Univ., University Park. Dept. of Civil Engineering. For primary bibliographic entry see Field 4A. W79-02598

UNSTEADY STREAMFLOW SIMULATION USING A LINEAR IMPLICIT FINITE-DIFFERENCE MODEL,

Geological Survey, NSTL Station, MS. Water Resources Div.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 127, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 78-59, May 1978. 59 p, 1 fig, 7 ref.

Descriptors: *Unsteady flow, *Model studies, *Channel morphology, *Reach(Streams), *Simulation analysis, Flow rates, Streamflow; Roughness coefficient, Mannings equation, Hydraulic properties, Backwater, Computer models, *Finite-difference models ence model

A computer program for simulating one-dimensional subcritical, gradually varied, unsteady flow in a stream has been developed and documented. Given upstream and downstream boundary conditions and channel geometry data, roughness coefficients, stage, and discharge can be calculated anywhere within the reach as a function of time. The program uses a linear implicit finite-difference technique that discritizes the partial differential equations. Then it arranges the coefficients of the continuity and momentum equations into a pentacontinuity and momentum equations into a penta-diagonal matrix for solution. Because it is a reasondiagonal matrix for solution. Because it is a reasonable compromise between computational accuracy, speed and ease of use, the technique is one of the most commonly used. The upstream boundary condition is a depth hydrograph. However, options also allow the boundary condition to be discharge or water-surface elevation. The downstream boundary condition is a depth which may be constant, self-setting, or unsteady. The reach may be divided into uneven increments and the cross sections may be nonprismatic and may vary from one to the other. Tributary and lateral inflow may enter the reach. The digital model will simulate such common problems as (1) flood waves, (2) late such common problems as (1) flood waves, (2) releases from dams, and (3) channels where storage is a consideration. It may also supply the needed flow information for mass-transport simulation. (Woodard-USGS) W79-02644

METHODS FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS IN AR-

Geological Survey, Tucson, AZ. Water Resources Div.

R. H. Roeske.

Arizona Department of Transportation Report, Phoenix, Report ADOT-RS-15-121, September 1978. 82 p, 9 fig, 5 tab, 14 ref. (Prepared in cooper-ation with Department of Transportation, Federal Highway Administration.) HPR-1-15(121), 73-10.

Descriptors: *Flood frequency, *Flood peak, *Estimating, *Regression analysis, *Regional analysis, Arizona, Peak discharge, Methodology, Equations, Evaluation, Ungaged sites, Basin characteristics.

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Group 2E-Streamflow and Runoff

Regression equations for estimating flood magnitudes at ungaged sites for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years were developed for six flood-frequency regions in Arizona. The equations relate flood magnitudes to one or more of the following statistically independent variables size of drainage area, mean basin elevation, and mean annual precipitation. The regression equations are based on annual peak-discharge data collected at 221 gaging stations having 10 or more years of record. Flood magnitudes for selected recurrence intervals were determined for each station from a log-Pearson Type III frquency distrition from a log-Pearson Type III frquency distri-bution, and multiple-regression analyses were used to relate flood magnitudes to basin characteristics. The regression equations apply to streams that are not affected significantly by regulation, diversion, or urbanization. Flood magnitudes and frequencies for the main stem of the Little Colorado River from the Zuni River to the mouth and for the main stem of the Gila River can be estimated from graphs in which discharge is related to size of drainage area for the Little Colorado River and to miles upstream and downstream from Coolidge Dam for the Gila River. (Woodard-USGS)

A RAINFALL-RUNOFF MODELING PROCE-DURE FOR IMPROVING ESTIMATES OF T-YEAR (ANNUAL) FLOODS FOR SMALL DRAINAGE BASINS,

Geological Survey, Lakewood, CO. Water Re-

sources Div.
R. W. Lichty, and F. Liscum.

R. W. Lichty, and F. Liscum. Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 187, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 78-7, August 1978. 44 p, 9 fig, 7 tab, 23 ref.

Descriptors: *Model studies, *Floods, *Small watersheds, *Rainfall-runoff relationships, Regional analysis, Mathematical models, Analytical techniques, Regression analysis.

Maps depicting the influence of a climatic factor. Maps depicting the influence of a climatic factor, C, on the magnitude of synthetic T-year (annual) floods were prepared for a large portion of the eastern United States. The climatic factors were developed by regression analysis of flood data using a parametric rainfall-runoff model and long-term rainfall records. Map estimates of C values and calibrated values of rainfall-runoff model parameters were used as variables in a synthetic T. and callorated values of rainfail-runoil model parameters were used as variables in a synthetic T-year flood relation to compute 'map-model' flood estimates for 98 small drainage basins in a six-state study area. Improved estimates of T-year floods were computed as a weighted average of the map-model estimate and an observed estimate, with the model estimate and an observed estimate, with the weights proportional to the relative accuracies of the two estimates. The accuracy of the map-model estimates was appraised by decomposing components of variance into average time-sampling error associated with the observed estimates and average map-model error. Map-model estimates have an accuracy, in terms of equivalent length of observed record, that ranges from 6 years for the 1.25-year flood up to 30 years for the 50- and 100-year flood. (Woodard-USGS) W79-02652

SURFACE WATER RESOURCES OF NORTH-WEST FLORIDA

Johnson (Bernard), Inc., Houston, TX.

Z. Qureshi.

Water Resources Bulletin, Vol. 14, No. 3, p 710-718, June 1978. 2 fig, 2 tab, 8 ref.

Descriptors: *Surface waters, *Florida, *Precipita-tion, *Evapotranspiration, *Basins, *Water bud-gets, Drainage, Inflow, Outflow, Runoff, Gaging stations, Groundwater.

Of the 1,700 streams located in Florida, the northwest area contains approximately 1,000 streams and three of the five largest rivers, namely the Apalochicola, the Choctawhatchee and the Escambia. This 11,200 square-mile area contains 11 drainage basins and receives an average annual rainfall which ranges from 53 inches in the east to

67 inches in the west. Basin water yields range from a high of 3,376 cfs (2,180 mgd) to a low of 672 cfs (434 mgd). Individual basin outflows range from a high of 25,743 cfs (16,630 mgd) to a low of 844 cfs (345 mgd). Approximately 67 percent of the total northwest Florida basin outflows to the Gulf of Mexico, or 36,805 cfs (23,766 mgd), are received in the form of surface water inflows from Alabama and Georgia. In the absence of any interstate mechanism for water management between Alabama, Florida, and Georgia, the basin outflow estimates presented herein depend greatly on the upstream usage in the neighboring states. The establishment of a tri-state water management program could eliminate the uncertainty involved in predicting water availability in northwest Florida and insure sufficient quantities of flows in the streams. (Bell-Cornell) W79-02727

APPLICATION OF COMPUTER WAVEFORM MATCHING TO MONITORING OF HYDRO-LOGIC SYSTEM PARAMETERS,

Nebraska Univ., Lincoln For primary bibliographic entry see Field 7C. W79-02836

2F. Groundwater

ANALYSIS OF GRAVITY DATA FROM THE PICACHO BASIN, PINAL COUNTY, ARIZO-

Arizna Univ., Tucson. Dept. of Geoscience For primary bibliographic entry see Field 7C. W79-02599

WATER WELLS AND SPRINGS IN PALO VERDE VALLEY, RIVERSIDE AND IMPERI-AL COUNTIES, CALIFORNIA,

Geological Survey, Laguna Niguel, Water Resources Div For primary bibliographic entry see Field 7C. W79-02647

GROUNDWATER IN THE NEWBERG AREA, NORTHERN WILLAMETTE VALLEY,

Geological Survey, Portland, OR. Water Resources Div.

F. J. Frank, and C. A. Collins.

Oregon State Engineer Ground Water Report No. 27, 1978. 77 p, 9 fig, 2 plates, 6 tab, 18 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water level fluctuations, *Water quality, Groundwater availability, Water yield, Withdrawal, Groundwater recharge, Hydrogeology, Drillers logs, Oregon, *Northern Willamette Valley, *Newberg area.

The Newberg area in Oregon consists of a series of uplands bounded by narrow low-lying plains and valleys and is approximately 360 square miles in size. In the western part, many of the wells that tap older volcanic and marine sedimentary rocks produce insufficient volumes of water for most uses. With the exception of the Troutdale Formation, nonmarine sedimentary rocks generally are poorly permeable sand and silt or lack the necessary thickness to store large volumes of water. Yields of most wells tapping the Troutdale Formation range from 20 to 150 gallons per minute. The most important aquifer in the area is the Columbia River Basalt Group. Wells drilled into the basalt generally produce from 15 to 1,000 gallons per minute. In The Newberg area in Oregon consists of a series of Basalt Group. Wells drilled into the basalt general-ly produce from 15 to 1,000 gallons per minute. In a small part of the east side of the Newberg area, water levels in some wells have declined about 1 foot per year. In most of the basalt outcrop area, water-level fluctuations are seasonal. Ground water-level fluctuations are seasonal. Ground water from the Columbia River Basalt Group and the nonmarine sedimentary rocks is chemically suitable for domestic and most other uses. Some of the wells drilled into the marine sedimentary rocks produce water that is too mineralized for general use. (Woodard-USGS) W79-02650

LINEAR GROUND-WATER FLOW, FLOOD-WAVE RESPONSE PROGRAM FOR PROGRAMMABLE CALCULATORS,

Geological Survey, Louisville, KY. Water Resources Div.
J. M. Kernodle.

Open-file report 78-356, July 1978. 48 p, 4 fig, 2 tab, 5 ref.

Descriptors: *Groundwater movement, *Flow, *Simulation analysis, Analytical techniques, Diffusivity, Surface-groundwater relationships, Model studies, Programming languages, Equations, Linear programming, *Programmable calculators.

Linear programming, *Programmable calculators.

Two programs are documented which solve a discretized analytical equation derived to determine head changes at a point in a one-dimensional ground-water flow system. The programs, written for programmable calculators, are in widely divergent but commonly encountered lanuages and serve to illustrate the adaptability of the linear model to use in situations where access to true computers is not possible or economical. The analytical method assumes a semi-infinite aquifer which is uniform in thickness and hydrologic characteristics, bounded on one side by an impermeable barrier and on the other parallel side by a fully penetrating stream in complete hydraulic connection with the aquifer. Ground-water heads may be calculated for points along a line which is perpendicular to the impermeable barrie and the fully penetrating stream. Head changes at the observation point are dependent on (1) the distance between that point and the impermeable barrier, (2) the distance between the line of stress (the stream) and the impermeable barrier, (2) the distance between the line of stress (the stream) and the impermeable barrier, (3) aquifer diffusivity, (4) time, and (5) head changes along the line of stress. The primary application of the programs is to determine aquifer diffusivity by the flood-wave response technique. (Woodard-USGS) response to W79-02651

PRELIMINARY APPRAISAL OF THE GEOHY-DROLOGIC ASPECTS OF DRAINAGE WELLS, ORLANDO AREA, CENTRAL FLORIDA, Geological Survey, Tallahassee, FL. Water Resources Div.

For primary bibliographic entry see Field 4B. W79-02656

FEASIBILITY OF WATER-SUPPLY DEVELOP-MENT FROM THE UNCONFINED AQUIFER IN CHARLOTTE COUNTY, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-

Geological Survey, Tallahassee, FL. sources Div.

For primary bibliographic entry see Field 4B. W79-02662

NICOMEKI-SERPENTINE BASIN STUDY, BRITISH COLUMBIA,

Department of Fisheries and Environment, Van-couver (British Columbia). Water Resources

For primary bibliographic entry see Field 4B. W79-02785

A THREE-DIMENSIONAL GALERKIN FINITE ELEMENT MODEL FOR THE ANALYSIS OF CONTAMINANT TRANSPORT IN VARIABLY SATURATED POROUS MEDIA, GUIDE.

Waterloo Univ. (Ontario). Dept. of Earth Sciences. For primary bibliographic entry see Field 5B. W79-02838

UNCERTAINTIES OF KARSTIC WATER RESOURCES SYSTEMS,

Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.

L. Duckstein, and L. Simpse

In: Karst Hydrology and Water Resources, Proceedings of the U.S.-Yugoslavian Symposium, Dubronik June 2-7 1975, Water Resources Publications, p 793-814, June 1976, 4 fig. 3 tab, 20 ref. OWRT B-043-ARIZ(12), 14-31-0001-5056.

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Descriptors: *Karst hydrology, Groundwater management, *Risks, *Bayes analysis, *Groundwater models.

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Uncertainties in karst water resource systems are identified and analyzed from the viewpoint of decision making. A discrete system framework is used to establish a two-way classification of five system elements versus six types of uncertainties. Typical system elements are: rainfall (input), cavity size (state), rainfall discharge relationship (state transition function), benefit-cost (output), and loss curves (output function). The uncertainty types may be natural, model, asmple, economic, technological, or strategic. The problem of design under uncertainty is illustrated by the control of a karst reservoir. The effects of natural, model, and economic uncertainty on the decision (pumpage or release out of the reservoir) are briefly illustrated. Then the finite state model (PSM) is used to ascertain how input uncertainty affects the output. Use of the same FSM model for state (cavity size) identification is cast in a Bayesian framework. A complete Bayesian analysis of input uncertainty is given, which leads to the evaluation of the value of perfect information and the worth of one more sample point. With the information provided on the effect of various uncertainties, it is possible to allocate resources optimally from the viewpoint of decreasing the overall uncertainty in the decision-making process.

W79-02883 making process. W79-02883

WELL FIELD SITE SELECTION BASED ON GEOLOGIC CRITERIA THAT INFLUENCE GROUND WATER CIRCULATION IN THE VICINITY OF LARAMIE, WYOMING, WYOMING Univ., Laramie. Water Resources Research Inst.

For primary bibliographic entry see Field 4B. W79-02912

DUG-WELLS, DUG-CUM-BORE WELLS, AND TUBEWELLS,
Central Groundwater Board, Nagpur (India).

For primary bibliographic entry see Field 4B. W79-02994

2G. Water In Soils

EVALUATION OF THE MC-300A SOIL MOISTURE METER TO DETERMINE IN-PLACE MOISTURE CONTENT OF REFUSE AT LAND DISPOSAL SITES, Environmental Protection Agency, Cincinnati, OH. Solid Waste Management Office. For primary bibliographic entry see Field 5A. W79-02503

ROOT GROWTH IN CORES FORMED FROM FRAGIPAN AND B2 HORIZONS OF HOBSON SOIL,

Missouri Univ.-Columbia. Dept. of Agronomy. R. W. Blanchar, C. R. Edmonds, and J. M.

Bradford.

Soil Science Society of America Journal, Vol 42, No. 3, p 437-440, May-June, 1978. 4 fig, 2 tab, 24 ref. OWRT A-087-MO(3), 14-34-0001-6026 and 7053.

Descriptors: Soil strength, Bulk density, Penetrometer, Root stimulation, *Root growth, *Fragipan, Soil horizons, *Hobson soil, *Root systems.

The effect of changes in acidity and bulk density of cores formed from B2 and fragipan horizons of a Hobson soil on probe penetration and pea root growth were evaluated. Increasing soil pH in the range of 4.2-6.5 had no measurable effect on probe resistance, but resulted in greater root length in both B2 and fragipan samples. Probe penetration resistance increased as bulk density was increased. The salty clay loam B2 horizon was more resistant to probe penetration than the sandy loam fragipan when compared at the same bulk density and moisture tension. Root length was more closely related to probe penetration resistance than to bulk density. Root growth in both B2 and fragipan soil decreased as probe resistance increased from 10 to 20 bars and essentially stopped in soil where probe penetration resistance exceeded 20 bars. W79-02592

PREDICTION OF HYDRAULIC CONDUCTIV-ITY CHANGES USING SOIL CHARACTERIS-

Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.

D. G. Boyer. D. G. Boyer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 380, Price codes: A08 in paper copy, A01 in microfiche.
M.S. Thesis, 1978. 143 p., 15 fig. 12 tab, 41 ref, 3 append. OWRT A-035-ARIZ(2), 14-34-0001-3803.

Descriptors: *Hydraulic conductivity, Permeameter, Soil sealants, *Arizona, *Soil analysis, Soil texture, Sodium adsorption ratios.

Permeameter experiments were performed on six Arizona soils using a solution of 12.5 meq/l and varied sodium concentrations. Hydraulic conductivities for five soils were reduced 60 to 95 percent for input solutions having maximum sodium adsorption ratios (SAR) of 25. Effective soil sealing occurred even though the soils were alkaline. Sealing sodium appears nearly irreversible at low solution concentrations and saturated conditions. The soil having the highest initial hydraulic conductivity recovered less than 20 percent of the original conductivity upon reapplication of a calcium solution. These results are useful when considering sealing small ponds by sodium applications. Hydraulic conductivity changes from increases in solution SAR were described mathematically using two empirically determined parameters that appear unique for each soil at a constant concentration. The parameters found for this study, plus those found from data of previous studies, were compared using multiple regression analysis to determine the most significant soil properties in predicting conductivity changes. Soil texture has the greatest influence on the parameters. An equation derived by combining data from eleven alkaline soils was selected as best for predicting hydraulic conductivities resulting from SAR changes. Predictions should be improved if additional soil data were available for analysis.

TRANSFORMATIONS OF ORGANIC PHOS-PHORUS SUBSTRATES IN SOILS AS EVALU-ATED BY NAHCO3 EXTRACTION,

Agricultural Research Service, Fort Collins, CO. For primary bibliographic entry see Field 2K. W79-02674

EMPIRICAL EQUATIONS FOR SOME SOIL HYDRAULIC PROPERTIES, Virginia Univ., Charlottesville. Dept. of Environ-

mental Sciences

R. B. Clapp, and G. M. Hornberger.
Water Resources Research, Vol. 14, No. 4, p 601-604, August 1978. 2 fig, 2 tab, 15 ref. OWRT A-058-VA(2).

Descriptors: *Hydraulic properties, *Soil water, *Infiltration, *Equations, Model studies, *Mathematical models, Soil moisture, Soil water movement, Soils, Soil texture, Soil properties, Hydraulic conductivity, Soil physics, Soil science, Empirical

The soil moisture characteristic may be modeled as a power curve combined with a short parabolic section near saturation to represent gradual air entry. This two-part function-together with a power function relating soil moisture and hydraulic conductivity- was used to derive a formula for the wetting front suction required by the Green-Ampt equation. Representative parameters for the moisture characteristic, the wetting front suction, and the sorptivity, a parameter in the infiltration equation derived by Phillip, were computed by using the desorption data of Holtan, et al. Average values of the parameters, and associated standard

deviations, were calculated for 11 soil textural classes. The results of this study indicated that the exponent of the moisture characteristic power curve can be predicted reasonably well from soil texture and that gradual air entry may have a considerable effect on a soil's wetting front suction. (Sims-ISWS) W79-02679

REMOTE SENSING OF SURFACE SOIL MOIS-

REMOTE SENSING OF SURFACE SOIL MOIS-TURE, National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center. For primary bibliographic entry see Field 7B. W79-02682

SIMULATION OF NUTRIENT LOSS FROM SOILS DUE TO RAINFALL ACIDITY, Corvallis Environmental Research Lab., OR. For primary bibliographic entry see Field 5B. W79-02730

GROWTH, ABUNDANCE AND DISTRIBUTION OF LARVAL TABANIDS IN EXPERIMENTALLY FERTILIZED PLOTS ON A MASSACHUSETTS SALT MARSH, Marine Biological Lab., Woods Hole, MA. Boston Univ. Marine Program. For primary bibliographic entry see Field 2L. W79-02755

SOILS OF THE INTER-TIDAL MARSHES OF DIXIE COUNTY, FLORIDA,

Florida Agricultural and Mechanical univ., Talla-hassee. Dept. of Soil Science.

Florida Scientist, Vol. 41, No. 2, p 82-90, Spring, 1978. 2 fig, 2 tab, 23 ref.

Descriptors: *Soil types, *Tidal marshes, *Florida, Marshes, Wetlands, Soils, Clays, Organic matter, Erosion, Storms, Sulfur, Hydrogen ion concentra-tion, Cation exchange, Dixie County(Fla).

Tidal marsh soils are diverse and have been sub-jected to considerable mixing. The soils are wet, near neutral in pH and have organic matter and near neutral in pH and have organic matter and clays concentrated at the surface resulting in high cation exchange capacities. Limestone occurs within 0.5-2.0 m of the soil surface. Psammaquents occur in lower marsh and Haplaquods in the upper marsh sites. Sulfaquents were found at the mouth of the Suwannee River. (Stihler-Mass) W79-02757

SOILS OF MARINE MARSHES,

Sorips Institution of Oceanography, La Jolla, CA. F. B. Phleger.
In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 69-77. 5 fig, 1 tab, 38 ref.

Descriptors: *Salt marshes, *Soil formation, *Sedimentation, Wetlands, Marshes, Coastal marshes, Muck soils, Soil microorganisms, Sedimentation

The mineral composition of sediment varies upon the composition of the source materials availale in the drainage basin or in the adjacent open ocean. the composition of the source materias available in the drainage basin or in the adjacent open ocean. Organism contribute significant amounts of material in the form of plant debris and calcareous shell material. Marshes accumulate the finest sediment available in the system due to the low current velocities in the very shallow water. The finest sediments are deposited at the end of the tidal excursions where there is slack water or at the shallow edge of the estuary where dead water occurs. Marsh soils may have alternating laminae of coarse and fine sediment in certain locations. But most sediments are considerably reworked and otherwise modified by the roots of marsh plants and certain animals. Biogenic reworking can concentrate sand and product fecal pellets from organisms which ingest sediments to extract food. The pH of the soil surface water varies, depending on the time of day, and also upon the stage of the tide

Group 2G-Water In Soils

in lagoonal marshes where there is marked tidal influence. Relative rates of deposition of sediment are indicated by the percent of the total foraminiferal, a type of shelled microorganism, population which is alive at the time of collection. (See also W79-02762) (Steiner-Mass) W79-02766

CHEMICAL CHARACTERISTICS OF A FEED-LOT SOIL PROFILE.

Agricultural Research Service, Lincoln, NE. For primary bibliographic entry see Field 5B. W79-02783

USE OF NEUTRON ACTIVATABLE TRACERS FOR SIMULATING WATER AND CHEMICAL FLOW THROUGH POROUS MEDIA, Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.

For primary bibliographic entry see Field 5B. W79-02814

SOIL MORPHOLOGIC AND HYDRAULIC CHANGES ASSOCIATED WITH WASTEWATER IRRIGATION,

Pennsylvania State Univ., University Park. Dept. of Agronomy.

For primary bibliographic entry see Field 5G.
W79-02817

DEVELOPING PROCEDURES FOR PREDICT-ING EFFECTIVENESS IN SEEPAGE CONTROL,

Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4A. W79-02820

INTERACTION BETWEEN LANDFILL LEA-ATES AND CARBONATE-DERIVED RESID-UAL SOILS.

Missouri Univ.-Columbia. Dept. of Geology. For primary bibliographic entry see Field 5B. W79-02829

SOIL AND WATER LOSS FROM CONSERVA-TION TILLAGE SYSTEMS,

Science and Education Administration, Ames, IA North Central Region. For primary bibliographic entry see Field 3F. W79-02852

ADSORPTION, MOBILITY AND DEGRADA-TION OF CYANAZINE AND DIURON IN

Nebraska Univ., Lincoln. Dept. of Agronomy. For primary bibliographic entry see Field 5B. W79-02909

ATRAZINE PERSISTENCE IN A VALENTINE

LOAMY FINE SAND PROFILE, Nebraska Univ., Lincoln. Dept. of Agronomy. For primary bibliographic entry see Field 5A. W79-02910

RELATIONS BETWEEN SOIL NUTRIENTS AND VEGETATION IN WETHEATHS. II. NU-TRIENT UPTAKE BY THE MAJOR SPECIES IN THE FIELD AND IN CONTROLLED CON-DITIONS.

Imperial Coll. of Science and Technology, London (England). Dept. of Botany. For primary bibliographic entry see Field 2H. W79-02939

THE PRODUCTIVITY OF A RANGE OF BLANKET BOG VEGETATION TYPES IN THE NORTHERN PENNINES,

Nature Conservancy, Alston (England). For primary bibliographic entry see Field 2I.

NUTRIENT LIMITATIONS TO PLANT PRODUCTION IN TWO TUNDRA COMMUNITIES, Alberta Univ., Edmonton. Dept. of Botany. For primary bibliographic entry see Field 21. W79-02947

FOSSIL PLANTS AND COAL: PATTERNS OF CHANGE IN PENNSYLVANIA COAL SWAMPS OF THE ILLINOIS BASIN, Illinois Univ. at Urbana-Champaign. Dept. of Botany.

For primary bibliographic entry see Field 2H. W79-02955

2H. Lakes

CONCENTRATIONS OF TEN HEAVY METALS IN SOME SELECTED LAKE POWELL GAME

New Mexico Univ., Alburguerque, Dept. of Biol-For primary bibliographic entry see Field 5B. W79-02582

AGE, GROWTH, AND FOOD HABITS OF THE FATHEAD MINNOW, PIMEPHALES PROME-LAS, IN NORTH DAKOTA SALINE LAKES, North Dakota State Univ., Fargo. Dept. of Zoo-

gy. W. Held, and J. J. Peterka. Transactions of the American Fisheries Society Vol. 103, No. 4, p 743-756, October, 1974. 2 fig, 7 tab, 31 ref. OWRT A-027-NDAK(2), 14-31-0001-

Descriptors: *Minnows, Life history, Studies, Ecology, Bioassay, Salinity, Resistance, Potholes, Lakes, *Fish reproduction, Fish eggs, *Fish diets, *North Dakota, *Saline lakes.

*North Dakota, *Saline lakes.

Fathead minnows (Pimephales promelas Rafinesque) were abundant in 9 of 10 prairie pothole lakes in south-central North Dakota, selected to represent extremes in salinity. Fathead minnows were found in lakes with mean concentrations of total dissolved solids during ice-free periods ranging from 285 to 7,036 mg/liter; no fish were found in North Lake George with a mean concentration of 23,489 mg/liter total dissolved solids. Crustaceans were the most important food group by number, volume, and frequency of occurrence in 541 fathead minnow intestines collected from seven lakes during summer and fall 1969. Cladocerans were most important, followed by copepods and amphipods. Analysis of 30 brook sticklebacks (Culaea inconstans) from Wildlife Lake, 13 lowa darter (Etheostoma exile) from Barnes Lake, and 5 tiger salamander larvae (Ambystoma tigrinum) from South Alkaline Lake indicated that Crustacea was the most important food group for these organisms. Fathead minnow fry appeared in early June and were seined (0.32-cm mesh) throughout the summer from 1 July to 1 September. The mean total length was 41 mm at the end of the first year of life and 58 mm at the end of the second. Only one fathead minnow from 2,100 aged had three annuli. Most fathead minnows in the lakes studied matured and spawned during their second summer and then died. and then died. W79-02590

WATER WETLANDS, AND WOOD STORKS IN SOUTHWEST FLORIDA,

Florida Univ., Gainesville, Dept. of Environmental Engineering Sciences. J. A. Browder. PhD Dissertation. August, 1976. 406 p.

Descriptors: *Wetlands, *Florida, *Water levels, *Wading birds, Water birds, Model studies, Simulation analysis, Computer models, Surface waters, Rainfall intensity.

Energy circuit models were used to study an oscil-lating ecosystem, the seasonally expanding and contracting wetlands of southwest Florida. Analog digital computers were used to simulate the effects

of the natural rainfall pattern and of drainage on seasonal expansion and contraction of water area, production and concentration of fish, and feeding and reproduction of the Wood Stork (Mycteria americana). Regional-scale depth-area, area-volume, and depth-volume curves were developed to relate the intensity and timing of rain to the seasonally changing area of surface water. Classical hydrologic equations were combined with the regional curves to produce a water model simulating seasonal and long-term water storage and runoff. Patterns of land area covered by water from the water model were used to derive three models relating water patterns to fish and storks. Drainage and a downward trend is rainfall for the past 15 years have stressed the ecosystems causing a decline in wading birds. Simulations suggest that drainage more than decline in rainfall was responsible for the decrease in storks. Wood Storks have shown resiliency in adapting to the drained conditions, finding new feeding areas such as the marshes at Lake Okeechobee. (Steiner-Mass) W79-02677

SATELLITE OBSERVATIONS OF CALCIUM CARBONATE PRECIPITATIONS IN THE GREAT LAKES,

National Environmental Satellite Service, Washington, DC. For primary bibliographic entry see Field 7B. W79-02685

HABITAT AND SUCCESSIONAL CHANGES OF THE ATLANTIC COASTAL RIDGE OF PALM BEACH COUNTY, FLORIDA, Florida Atlantic Univ., Boca Raton. Coll. of Sci-

For primary bibliographic entry see Field 2I. W79-02713

BIOLOGICAL PRODUCTIVITY GEORGIA RIVER SWAMPS, IN TWO Tennessee Univ., Knoxville. H. E. Boyd. PhD Dissertation, August, 1976. 98 p.

Descriptors: *Georgia, *Swamps, *Productivity, Wetlands, Oak trees, Nutrients, Mammals, Wildlife, Growth rates, Animal populations.

Data from coastal plain swamp sites showed corre-lations between the physiographic origins of two rivers, their load of dissolved and suspended matter, floodplain soil nutrient levels, height and diameter growth for the oak, Quercus laurifolia, and the standing crops and turnover of small mammal species. Soils of the Oconee River flood-lain users statistically significantly higher in conmammal species. Soils of the Oconee River flood-plain were statistically significantly higher in con-centrations of Ca, Mg, NO3, and Na, and had a significantly high pH. The Canooche floodplain was significantly higher only in phosphate. Statisti-cal tests comparing height on age and diameter on age for Laurel oaks showed significant differences between the two areas--both being faster in the Oconee floodplain. The oconee floodplain had higher densities of all small mammal species trapped. Only one species taken on the Oconee was not trapped on the Canoochee. Total cotton mouse biomass on the Oconee was as much as three times the biomass on the Canoochee when calculated from mean weights of each age category and the density for each period. The Oconee floodplain is believed to be more productive on the basis of greater cotton mouse biomass and turnover. (Steiner-Mass)

W79-02720

ECONOMIC INCENTIVES FOR INSTITU-TIONAL CHANGE: THE CASE OF THE VIR-GINIA WETLANDS ACT,

Virginia Polytechnic Inst. and State Univ., Blacks-burg. Dept. of Agricultural Economies. For primary bibliographic entry see Field 6E. W79-02721

THE EFFECT OF SALINITY AND TIDAL IN-UNDATION ON PHOTOSYNTHESIS AND

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PLANT WATER RELATIONS OF SPARTINA ALTENIFLORA LOISEL, Duke Univ., Durham, NC. Dept. of Botany. For primary bibliographic entry see Field 2I. W79-02725

SPATIAL CHANGES IN WATERFOWL HABI-

TAT, Canadian Wildlife Service, Ottawa (Ontario). G. D. Adams, and G. C. Gentle. Occasional Paper Number 38, 29 p, 1978. 5 fig, 8

Descriptors: *Wetlands, *Wildlife habitat, *Waterfowl, *Spatial distribution, *Temporal distribution, Fresh water marshes, *Land use, Ducks(Wild), Aquatic habitat, Land classification, Distribution patterns, Vegetation.

patterns, Vegetation.

The effects of land use on two waterfowl habitat types, waterfowl capability class 1 land (Block II) ad class 3 land (Block II), were assessed by documenting spatial changes in wetlands and vegetative cover occurring between 1964 and 1974. Block I showed a higher density and surface area in wetlands. On Block II, wetlands were more permanent, but cultivated land occupied proportionally more area. Both blocks showed net decreases in grassland and woodland areas, and net increases in wildlife areas. Wetland areas increased by 20% on Block I and 31% on Block II. Partial drainage influenced 15% of 424 wetlands on Block I, but 20% were altered by drainage and clearing, and 7% were lost during the decade. Open water marsh perimeter increased by 24% on Block I, but total wetland perimeters increased only slightly. Since only 53% of wetland perimeters were open on Block I in 1964, compared to 26% open on Block II, there was probably more intensive pothole clearing on Block I prior to 1964. Despite the tincrease in wetland areas, the quantitative reduction in grassland cover on wetland margins has probably reduced potential duck nesting habitat. (Steiner-Mass)

APPLICATIONS OF REMOTELY SENSED DATA TO WETLAND STUDIES, Geological Survey, Reston, VA. For primary bibliographic entry see Field 7B. W79-02749

HISTORICAL LAND USE CHANGES AND IMPACTS IN LAKE CHAMPLAIN WETLANDS (1941/42, 1962, 1974),
New England River Basins Commission, Burlington VT. Lake Champlain Basin Study.
For primary bibliographic entry see Field 4C. W79-02750

DEVELOPMENTAL AND ENVIRONMENTAL HISTORY OF THE DISMAL SWAMP, Indiana Univ. at Bloomington. Dept. of Botany. D. R. Whitehead.

Ecological Monographs, Vol. 42, No. 3, p 301-315, 1972. 9 fig, 39 ref.

Descriptors: *Swamps, *Pollen, *Distribution pat-terns, *History, *Trees, *Virginia, Wetlands, Peat, Sediments, Geologic time, Vegetation, Dismal Swamp(Va NC), North Carolina.

Pollen analysis has indicated that the swamp is a relatively young feature, having begun to develop along drainage lows as recently as the late-glacial. Formation of extensive freshwater marshes along streams appears to have been brought about by general water table changes controlled by the post-glacial rise of sea level. As the sea continued to rise, marsh development proceeded inland and fine-grained organic sediments began to accumulate. By 6,000 B.P. approximately 50% of Dismal Swamp area had been mantled by fine-grained peat deposits. From 6,000 to 3,500 B.P. peat accumulation continued, but at an appreciably lower rate. This corresponds both to the hypsithermal interval and to a distinct slackening in the rate of sea level rise. By 3,500 B.P. peat had mantled virtually all of

the interfluves and islands within the swamp. The the intersuves and islands within the swamp. The pollen diagrams suggest a gradual change from boreal spruce-pine forests during the full-glacial, to somewhat less boreal pine-spruce during the late-glacial, to hardwood forests containing many species characteristic of the present northern hardwoods forests during the latter portion of the late-glacial, to hardwood-dominated forests containing species now found in southeastern Virginia during the early post-glacial. (Steiner-Mass) W79-02751

NESTING WADING BIRD POPULATIONS IN SOUTHERN FLORIDA,
Everglades National Park, Homestead, FL.

For primary bibliographic entry see Field 2I.

EFFECTS OF GRASS CARP INTRODUCTION ON MACROPHYTIC VEGETATION AND CHLOROPHYLL CONTENT OF PHYTO-PLANKTON IN FOUR FLORIDA LAKES,

Florida State Game and Freshwater Fish Commission, Lake Wales. R. D. Gasaway, and T. F. Drda. Florida Scientist, Vol. 41, No. 2, p 101-109, Spring, 1978. 5 fig, 1 tab, 21 ref.

Descriptors: *Aquatic plants, *Fish, Effects, *Grass carp, Algae, Rooted aquatic plants, Ponds, Lakes, Wetlands, *Florida.

Effects of grass carp on macrophytes and phytoplankton were studied in two natural ponds, a natural lake and a borrow pit. Macrophytes were reduced in all study areas after grass carp introduction, and several native species were eliminated although they remained where protected from grass carp. Eleocharis acicularis in Suwannee Lake was reduced from 40.16% to 0.4% cover one year after introduction. Chlorophyll a, b, and c content increased although generic richness of phytoplankton declined after introduction. (Stihler-Mass) W79-02758

SEICHE STRUCTURE AND VERTICAL MIXING BELOW THE EPILIMNION IN SMALL LAKES,

Michigan Univ., Ann Arbor. Div. of Biological

For primary bibliographic entry see Field 5C. W79-02813

A PRELIMINARY INVESTIGATION OF THE PHOSPHORUS LOADING CHARACTERISTICS OF LAKE CARNEGIE, PRINCETON, NEW JERSEY,

Rutgers - The State Univ., New Brunswick, NJ. Dept. of Chemical and Biochemical Engineering. For primary bibliographic entry see Field 5B. W79-02835

ISOTOPE HYDROLOGY OF INLAND SABK-HAS IN THE BARDAWIL AREA, SINAI, Weizmann Inst. of Science, Rehovot (Israel). Dept. of Research.

J. R. Gat, and Y. Levy. Limnology and Oceanography, Vol. 23, No. 5, p 841-850, September 1978. 2 fig, 3 tab, 14 ref.

Descriptors: Hydrology, *Isotope studies, *Surface waters, *Arid lands, Salinity, Salts, Brines, Coasts, Lakes, Runoff, Drainage, Evaporation, Groundwater, Subsurface waters, On-site data collections, Mathematical models, Data processing, Limnology, *Sabkhas, *Bardawil area(Sinai), *Sinai.

The changes in stable isotope composition of inland sabkhas can throw light on the hydrologic mechanisms which operate in these systems. Inflow waters were found to be of meteoric origin. Immediately after local rain, water drains from surrounding sand dunes onto the top of the salt crust, dissolving it. Further inflow of waters keeps the sabkhas inundated for weeks, but the different sabkhas were found to be open to varying degrees

to the inflow of groundwaters and to outflow of brines into bottom sediments. (Sims-ISWS) W79-02841

WARM BOTTOM WATER IN LAKE MICHI-

GAN, Florida State Univ., Tallahassee. Dept. of Oceanography.
G. Marmorino.

C. Martinology and Oceanography, Vol. 23, No. 5, p. 1017-1020. September 1978, 2 fig. 12 ref.

Descriptors: *Water temperature, *Lake Michigan, *Surveys, Measurement, Temperature, Lakes, Sounding, Stratification, Hypolimnion, Sampling, On-site investigations, Water properties, Water quality, Inversions.

A temperature increase of about 0.02C was measured with a freely falling probe in the bottom 12 m at a 100-m station in Lake Michigan in September 1977. Meter-thick temperature inversions were observed higher in the water column. The origin of the warmer water is unknown. (Sims-ISWS) W79-02843

THE ROLE OF ICE AND SNOW IN LAKE HEAT BUDGETS,
Trent Univ., Peterborough (Ontario). Dept. of Ge-

ography. W. P. Adams, and D. C. Lasenby. Limnology and Oceanography, Vol. 23, No. 5, p 1025-1028, September 1978. 3 tab, 9 ref.

Descriptors: *Heat budget, *Lakes, *Mathematical models, *Model studies, Equations, Snow, Ice, Freezing, Melting, Heat balance, Heat flow, Latent heat, Temperatire. Water temperature, Limnology.

Methods of precisely calculating the latent heat terms for snow and ice in the winter energy budget of lakes were presented. The ice term is normally overestimated and the snow term underestimated by existing methods. (Sims-ISWS) W79-02844

A NEW METHOD FOR COLLECTING WATER SAMPLES FROM BENEATH THE ICE, Queen's Univ., Kingston (Ontario). Dept. of Geological Sciences. For primary bibliographic entry see Field 7B. W79-02845

A CHEMICAL MODEL OF HEAVY METALS IN THE GREAT SALT LAKE, Utah Agricultural Experiment Station, Logan.

For primary bibliographic entry see Field 5B. W79-02913

CHEMICAL LIMNOLOGY OF GEORGIAN

Department of Fisheries and Environment, Burlington (Ontario). Water Quality Branch. For primary bibliographic entry see Field 5A. W79-02923

RIFTING IN THE OKAVANGO DELTA. Columbia Univ., New York. C. H. Scholz.

Natural History, Vol. 85, No. 2, p. 34-43, February, 1976.

Descriptors: *Freshwater marshes, *Deltas, *Wild-life, *Geomorphology, Impounded water, Marshes, Wetlands, *Rifting, Natural refuge, Kala-hari Desert, Botswana, Africa.

Okavango Delta, a perched water impoundment in the East African rift system formed by geologic faulting, is a fresh water swamp covering 6,500 sq miles in the Kalahari Desert region of Botswana. The delta supports a variety of plant and animal species including papyrus, mopani, pike, hippo-potamus, crocodile, antelope, and bis. It is one of the few game areas of Africa that has remained virtually unaffected by man due to its endemic

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populations of tsetse flies and mosquitos. The region acts as a natural refuge and watering ground for many species during the dry season. Current pressures on the region arise from increasing demands for water supplies and the need for cattle grazing land. (Howard-Mass)

ASSESSMENT OF THE PHYSICAL AND BIO-LOGICAL CHARACTERISTICS OF THE MAJOR LAKE CHAMPLAIN WETLANDS,

MAJOR LAKE CHAMPLAIN WEILANDS, State Univ. of New York Coll. at Plattsburgh. G. K. Gruendling, and D. J. Bogucki. Lake Champlain Basin Study, New England River Basins Commission, Burlington, Vermont, May, 1978. 36 p, 21 tab, 12 ref.

Descriptors: *Freshwater marshes, *Lakes, *Classification, Wetlands, Northeast U.S., Hydrology, Marsh plants, Distribution patterns, Soil types.

A synopsis is given of the various descriptive data presently available on the wetlands of Lake Cham-plain. The physical section of the report examines plain. The physical section of the report examines wetlands using the hydrologic location, wetland topography and configuration, geomorphic features and mode of origin, and surficial material as main criteria. Twelve Lake Champlain wetlands are classified as either bayhead, riverine, riverine/levee, deltaic, or lakeside areas. The biological section is divided into two major parts. Part I characterizes twelve major wetland areas that have been investigated over the past few years. These have had detailed vesetating areas constructed for have had detailed vegetation maps constructed for each wetland utilizing color and color infrared aerial photography, field surveys, and ecological studies relating plant distribution with soil types, water depths, and other environmental parameters. Part II summarizes cover-type maps for the remaining wetlands that have been investigated. (Steiner-Mass) W79-02937

THE RELATIONSHIP BETWEEN NET PRIMARY PRODUCTION AND ACCUMULATION FOR A PEATLAND IN SOUTHEASTERN MANITOBA,

Manitoba Univ., Winnipeg. Dept. of Botany. For primary bibliographic entry see Field 5C. W79-02938

RELATIONS BETWEEN SOIL NUTRIENTS AND VEGETATION IN WETHEATHS, II. NU-TRIENT UPTAKE BY THE MAJOR SPECIES IN THE FIELD AND IN CONTROLLED CON-

Imperial Coll. of Science and Technology, London (England). Dept. of Botany.

K. Loach

Journal of Ecology, Vol. 56, No. 1, p. 117-127, March, 1968. 8 tab, 16 ref.

Descriptors: *Vegetation, *Competition, *Soil properties, *Deficient elements, *Wetlands, Phosphorus, Nitrogen, Soil structure, Primary productivity, Saturated soils, Bogs, Heaths, England.

Growth of the major species in three sites (molinie-tum, central associes, and valley bog) was com-pared in the absence of interspecific competition. Performance in this experiment did not always reflect the relative abundances in the natural plant cover of these sites (apparently due to competi-tion). All species suffered the greatest reduction in dry weight when grown in the valley bog site. The soils were acutely deficient in phosphorus. In the field the phosphorus deficiency in the bog site is probably further aggrelated by the effects of waterlogging on root growth and nutrient uptake. Response to both these nutrients. Poor structure of the soils may have limited growth and response to nutrient additions in these soils. Drainage considerably improved growth in the Molinietum and central associes sites, drainage of the valley bog site was insufficient to improve growth because of the large nutrient deficiencies of the soils. (Stihler-Mass)

W79-02939

NUTRIENT-PHYTOPLANKTON RELATION-SHIPS IN THE HOLLAND MARSH, ONTAR-

Guelph Univ. (Ontario), Dept. of Zoology. For primary bibliographic entry see Field 5C. W79-02944

THE PHYSICAL ENVIRONMENT AND BOTTOM FAUNA OF A BOG LAKE, Newcastle-upon-Tyne Univ. (England). Dept. of

A. J. McLachlan, and S. M. McLachlan. Archiv Hydrobiologie, Vol. 76, No. 2, p. 198-217, October, 1975. 7 fig. 5 tab, 37 ref.

Descriptors: *Bogs, *Benthic fauna, *Distribution patterns, Wetlands, Peat, Aquatic animals, Aquatic microorganisms, Diptera, Lake soils.

Two of the major animal species inhabiting the mud of a bog lake show strong preferences for distinct areas of the bottom. This distribution is remarkable in view of the small size of the lake and the uniform water depth. The mud is composed entirely of peat, the only variation being in the size of the fragments in different parts of the lake. The two species—larvae of the midges Chironomus lugubris and Glyptotendipes paripes—are shown to be associated with sediments containing different proportions of fine particles. The association between substrate type and benthic animals is attributed to the relatively simple and stable nature of the ecosystem. (Steiner-Mass)

INFLUENCES OF SPRING WATER LEVELS ON AQUATIC AND RIPARIAN PLANT DIS-TRIBUTION IN UPPER RICHELIEU AND MISSISQUOI BAY AREAS,

Quebec Univ., Montreal. Dept. of Biological Sci-

C. Hamel, and P. Bhereur. Laboratory of Applied Botany, University of Quebec at Montreal, August, 1977. 55 p, 8 fig, 3 tab, 7 ref.

Descriptors: *Swamps, *Aquatic plants, *Water level fluctuations, Lakes, Wetlands, Distribution patterns, Water levels, Vegetation establishment, Reservoir management.

Water level variations in the Missisquoi Bay and Richelieu River regions of Lake Champlain has been related to the life cycles of the aquatic plants in the area. In spring, the annual and interim fluctuations are of considerable importance befluctuations are of considerable importance be-cause of their effect on forest regeneration and pike spawning grounds. The water level mark has relatively little influence on the plant life cycles, particularly those of trees, which are affected to a much greater extent by the length of the flood period. It is improbable that a permanent lowering of the maximum water levels would have a large impact on swamp forests which are generally comimpact on swamp forests which are generally composed of species which are very resistant to prolonged flooding. The aquatic plants, which are favored by the absence of natural competitors over long flood periods, would normally disappear from these swamp zones during low water, giving way to shrubby and herbaceous terrestrial vegetation. The distribution of aquatic plants in summer depends to a great extent on the water level. With high water levels, many aquatic plants invade the forests and with low water levels these species will withdraw from the forests and invade the middle regions of rivers and bays. (Steiner-Mass) W79-02950

BIOLOGICAL FOUNDATIONS OF FOREST DRAINAGE EFFICIENCY, Akademiya Nauk SSSR, Moscow. Lab. of Forest

For primary bibliographic entry see Field 21. W79-02951

WETLAND HABITAT EVALUATION, VAN-COUVER LAKE, WASHINGTON,
Jones and Stokes Associates, Inc., Sacra

CA.TTEATS K. Miller, and C. R. Hazel. November, 1977. 54 p, 6 fig, 6 tab, 15 ref.

Descriptors: "Wildlife habitat, "Wetlands, "Marsh management, "Washington, Lakes, Fresh water marshes, Dredging, Spoil banks, Environmental effects, "Vancouver Lake(Wash).

This report identifies and describes wetland and lowland wildlife habitats surrounding Vancouver Lake and estimates the value of these habitats to the dominant faunal species. An attempt is made to rank habitat types in order of their value to wildlife. The impact of lake dredging and spoil disposal on wildlife habitats are compared and evaluated for each proposed disposal site. Alternative plans of spoil disposal designed to avoid or minimize adverse impacts on the most valuable wildlife habitats are suggested as mitigation measures. The impacts of these alternatives are compared to those of the proposed project. Mitigation measures in the form of like-kind or trade-off compensation are discussed. (Steiner-Mass)

REEDS CONTROL EUTROPHICATION OF BALATON LAKE

Research Inst. for Water Resources Development, Budapest (Hungary). For primary bibliographic entry see Field 5G. W79-02954

FOSSIL PLANTS AND COAL: PATTERNS OF CHANGE IN PENNSYLVANIA COAL SWAMPS OF THE ILLINOIS BASIN, Univ. at Urbana-Champaign. Dept. of

T. L. Phillips, R. A. Peppers, M. J. Avcin, and P.

F. Laughnan. Science, Vol. 184, No. 4144, p 1367-1369, June 28, 1974. 1 fig. 15 ref.

Descriptors: *Swamps, *Peat, *Coals, *Palynology, Pollen, Sediments, Spores, Temporal distribution, Clubmoss, Tree ferns, Wetlands, Marshes,

Plant materials in coal balls are direct evidence of swamp vegetation, and through correlation of iso-lated spores and pollen with parent plants, coal palynology provides an extensive record of plant distribution. Lycopods, ferns, pteriodosperms, cor-daites, and sphenopsids are five major plant groups which lived in peat-forming swamps. Changes in coal-swamp floras and the botanical constituents of coal throughout Pennsylvanian time are the result of broad climatic shifts and local environmental factors. The most striking change is from a lyco-pod-dominated flora to one in which tree ferns were the major element. This change occurred at the Desmoinesian-Missourian (Westphalian-Ste-phanian) boundary and was probably multicontin-ental in scope. (Howard-Mass) W79-02955

A PRELIMINARY CLASSIFICATION OF WET-LAND PLANT COMMUNITIES IN NORTH-CENTRAL MINNESOTA, Fish and Wildlife Service, Jamestown, ND. North-ern Prairie Wildlife Research Center.

For primary bibliographic entry see Field 21. W79-02956

INVESTIGATION OF A NUTRIENT-GROWTH MODEL USING A CONTINUOUS CULTURE OF NATURAL PHYTOPLANKTON,

University of Strathclyde, Glasgow (Scotland). Dept. of Applied Microbiology. For primary bibliographic entry see Field 5C. W79-02962

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2I. Water In Plants

FLORISTIC ANALYSIS OF THE MISSOURI RIVER BOTTOMLAND FORESTS IN NORTH DAKOTA, North Dakota State Univ., Fargo. Dept. of

Botany.

W. R. Keammerer, W. Johnson, and L. Burgess.
Canadian Field-Naturalist, Vol. 89, No. 1, p 5-19, 1975. 2 fig. 5 tab, 26 ref. Contribution No. 182 from the Eastern Deciduous Forest Biome, US-IBP, and Publication No. 628, Environmental Sciences Division, Oak Ridge National Laboratory. OWRT A-022-NDAK(3), 14-31-0001-3534.

Much of the forest vegetation along the upper Missouri River has been inundated and destroyed by a series of large reservoirs. In North Dakota, the remnant forests fall readily into two classes, those dominated by Populus deltoides Marsh., and the more mesic forest of Fraxinus pennsylvanica Marsh., Acer negundo L., Ulmus americana L., and Quercus macrocarpa Michs. The vascular flora of these forests is comprised of 220 species, representing 54 families and 152 genera. Seven families (Compositae, Gramineae, Cyperaceae, Leguminosae, Labiatae, Rosaceae, and Ranunculaceae), all large families abundant in north-temperate regions, account for over half the total flora. Analysis of the Raunkiaer life-form in the flora of the bottomland forests shows the composition to be predominantly hemicryptophytic (53.2%). Phanerophytes and cryptophytes make up about 17% each, therophytes 11%, and only 1% of the flora is chamaephytic. Geographically, 73.1% of the species are North American, including arctic, sub-arctic, sub-arctic-temperate. and temperate distributions. Another 8% are circumpolar, while 18.6% are of European or Eurasian derivation. Many of the latter are widespread and wellknown waifs, agricultural weeds, and other ruderal species. A complete checklist is given, including notes on local distribution and relative abundance. W79-02588 W79-02588

ROOT GROWTH IN CORES FORMED FROM FRAGIPAN AND B2 HORIZONS OF HOBSON

Missouri Univ.-Columbia. Dept. of Agronomy. For primary bibliographic entry see Field 2G. W79-02592

APPLICATION OF FIVE METHODS FOR MEASUREMENT OF WILDLIFE VAUE; LOWER SHEYENNE RIVER BASIN, NORTH DAKOTA, North Dakota State Univ., Fargo. Dept. of Agri-

cultural Economics.

J. A. Leitch.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-290 386,
Price codes: A07 in paper copy, A01 in microfiche.

M.S. Thesis, Dec 1975, 133 p, 10 fig, 17 tab, 63 ref,
12 append. OWRT B-030-NDAK(3), 14-31-00015102.

Descriptors: *Wildlife habitats, River basins, Priorities, River basin development, Evaluation, Wildlife, *North Dakota, *Sheyenne River Basin(ND).

An attempt was made to (1) describe the wildlife community of the Lower Sheyenne River Basin (LSRB), and (2) determine the value of that wildlife community. An estimate of the species composition of wildlife was determined from the literature and personal communications with State Game and Fish Department personnel. To determine the value of this wildlife, five techniques were applied to the LSRB: (1) utility value, (2) expenditures, (3) the value of comparative private recreation, (4) wildlife land value, and (5) the priority evaluator technique, a photo choice game simulating the marketplace. Resulting values were (1) annual utility value of \$95,000 (S.11 to \$1.16 per acre), (2) annual expenditures vaue of \$304,777 (S.36 to \$4.18 per acre), (3) annual value of alternative private recreation of \$832,000 (S.98 to \$14.93 per acre), and (4) the land value technique revealed per acre), and (4) the land value technique revealed an annual per acre return for wildlife of up to \$33.

The priority evaluator technique did not yield a specific value but revealed that people were more willing to sacrifice other environmental variables before wildlife habitat. W79-02605

THE GENETIC BASIS OF THE ECOLOGICAL AMPLITUDE OF SPARTINA PATENS ON THE OUTER BANKS OF NORTH CAROLINA, Duke Univ., Durham, NC. Dept. of Botany. For primary bibliographic entry see Field 2L. W79-02669

ENVIRONMENTAL FACTORS LIMITING THE DISTRIBUTION OF FIVE PLANT SPECIES ON SALT MARSHES OF ISLAND BEACH, NEW JERSEY, Rutgers - The State Univ., New Brunswick, NJ. Dept. of Botany.
For primary bibliographic entry see Field 2L. W79-02678

HABITAT AND SUCCESSIONAL CHANGES OF THE ATLANTIC COASTAL RIDGE OF PALM BEACH COUNTY, FLORIDA Florida Atlantic Univ., Boca Raton. Coll. of Sci-

D. R. Richardson. M.S. Thesis. December, 1976. 87 p.

Descriptors: *Florida, *Vegetation, *Succession, *Wetlands, Swamps, Freshwater marshes, Land use, Coastal plains, Marsh plants, Distribution patterns, Drainage effects.

Predrainage effects.

Predrainage vegetational patterns of the Atlantic Coastal Ridge of Palm Beach County were mapped and a detailed analysis of vegetational changes regarding succession was made by selecting specific areas throughout the overall study region. These areas were described by documenting community changes with regard to species composition and community location. A checklist of the vascular flora was made for each selected area. Using the entire coastal strip vegetation map and specific study sites, generalizations were made regarding plant succession in the major plant communities; Beach, Coastal Strand, Tropical Hammock, Low Hammock, Scrub, Pine Flatwoods, Wet and Dry Prairies, Mangroves, Swamp, and Freshwater Marshes. Pre- and post-drainage historical and hydrological information was correlated with a geological history in order to show how the physical and biological factors affect vegetation. (Steiner-Mass)

THE EFFECT OF SALINITY AND TIDAL IN-UNDATION ON PHOTOSYNTHESIS AND PLANT WATER RELATIONS OF SPARTINA ALTENIFLORA LOISEL,

Duke Univ., Durham, NC. Dept. of Botany. D. J. Longstreth. PhD Dissertation, 1976, 124 p.

Descriptors: *Salt marshes, *Marsh plants, *Salt tolerance, Wetlands, Tidal marshes, Coastal marshes, Grasses, Salinity, Plant growth, Produc-

Plants grown under conditions of low daily irradiance showed a 50% decline in photosynthesis between 10 ppt and 30 ppt salinity. Plants grown a high daily irradiance showed relatively little effect of salinity on photosynthesis up to concentrations of 30 ppt. Analysis of resistance to the diffusion of CO2 showed that the differences in photosynthesis measured under high stress conditions were the result of an increase in both stomatal and internal excitators with the events of sections of the section of the sec result of an increase in both stomatal and internal resistance with the stomatal resistance being largest. Field measurements of diurnal patterns of leaf xylem pressure and photosynthesis indicate that timing of tides may be important in controlling daily photosynthetic patterns. As plants become exposed at low tide, water stress increases and photosynthesis apparently decreases even under conditions which would otherwise be optimal. Therefore, daily totals of carbon fixation may vary

depending on the timing of the tide. Maximal totals of carbon fixation may occur on days when the timing of high tide would alleviate water stress the most. Root inundation also does not have a negative effect on photosynthesis and in fact inundation may have a positive effect on plant response by relieving water stress.

W79-02725

SPATIAL CHANGES IN WATERFOWL HABI-

TAT, Canadian Wildlife Service, Ottawa (Ontario). For primary bibliographic entry see Field 2H. W79-02742

STUDIES ON THE ECOLOGY OF A STREAM-SIDE FOREST: COMPOSITION AND DISTRI-BUTION OF VEGETATION BENEATH THE TREE CANOPY,

Illinois Univ. at Urbana-Champaign. Dept. of For-

estry. D. T. Bell.

Bulletin of the Torrey Botanical Club, Vol. 101, No. 1, p 14-20, January-February, 1974. 2 fig, 1 tab, 13 ref.

Descriptors: *Forests, *Flood plains, *Ecological distribution, *Flood frequency, Wetlands, Habitats, Vegetation, Streams, Riparian plants, Flooding, *Illinois, Ecology.

Distributions of 64 understory species were examined in the streamside forest of Robert Allerton Park, Piatt County, Illinois. Understory vegetation was strongly influenced by the complex environmental gradient, inundated up to 20% of the time, harbor a hardy robust population of perennials. With increasing elevation, the number of species capable of surviving in the habitat increases. Mid-areas of the gradient do not harbor a unique plant association, but contain outliers from both the upper and lower portions. The light regime in the upper portions of the gradient further determines the partitioning of available habitat space. Unflooded areas experience a change in species dominance associated with the closing of the crown canopy in late spring. (Stihler-Mass)

NESTING WADING BIRD POPULATIONS IN SOUTHERN FLORIDA,

Everglades National Park, Homestead, FL. J. A. Kushlan, and D. A. White. Florida Scientist, Vol. 40, No. 1, p 65-72, Winter, 1977. 2 fig. 1 tab, 8 ref.

Descriptors: *Wading birds, *Florida, *Nests, *Surveys, Population, Birds, Wetlands, Wildlife, Animal populations, Seasonal, Waterbirds, Ever-glades, *Big Cypress Swamp(Fla).

A 1974-1975 survey located 41 colonies containing 129,800 wading birds including ibises, herons, and storks. The largest colony was a late summerautumn nesting colony in the Okaloacooche Slough in the Big Cypress Swamp. Only 25,900 wading birds, about 20% of the southern Florida population, nested in Everglades National Park during 1975. This indicates a great reduction since the 1930's and strongly suggests that some aspects of the natural ecological processes are no longer functioning in the southern Everglades National Park. White Ibis and Cattle Egret were most abundant species; populations of Great Egrets, Little Blue Herons, Louisiana Herons and Snowy Egrets were lower than expected. Wading birds nested year round but individual species had more circumscribed nesting seasons. (Stihler-Mass) W79-02753 W79-02753

NOTES ON THE FLORA OF THE CONGAREE RIVER FLOODPLAIN, RICHLAND COUNTY, SOUTH CAROLINA, South Carolina Wildlife and Marine Resources Dept. Columbia. Div. of Natural Area Acquisition and Resource Planning.

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Group 21-Water in Plants

I. I. Gaddy Castanea, Vol. 42, No. 2, p 103-106, June, 1977. 1 tab. 6 ref.

Descriptors: *Vegetation, *Flood plains, *South Carolina, *Congaree River(SC), Deciduous trees, Swamps, Wetlands, Size, Trees.

The flood plain harbors 26 State and 8 National record-sized trees. Trees up to 170 feet in height and 26 feet in circumference occur here. Although and 20 feet in circumstence occur where. Annually a complete floristic study of the area is yet to be done, five county records, three of which are rare in the Carolinas, have been found in the Beidler Track of the flood plain. (Stihler-Mass) W79_02756

CATTLE, WILDLIFE, AND RIPARIAN HABITATS IN THE WESTERN DAKOTAS,

Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

K. E. Severson, and C. E. Boldt.

R. E. Severson, and C. E. BORT. In: Management and Use of Northern Plains Ran-geland. Reg. Rangeland Symposium, February 27-28, 1978, Bismarck, North Dakota, p 90-103. 17 ref.

Descriptors: *Riparian plants, *Grazing, *Cattle, Effects, *Habitats, *Livestock, Wetlands, Trees, Shrubs, *Great Plains, North Dakota, South Dakota, Range management, Agriculture.

Three riparian habitat types occur in the Northern Great Plains: draws in the upper reaches of grass-land drainages, cottonwood-dominated floodplains, and juniper stands. Deciduous riparian habitats reand juniper stands. Deciduous riparian natitats re-ceive heavy livestock use because they provide shade, stay green longer than surrounding upland areas, and because they often indicate a water source. The results of such concentrated use are sparse stands of low vigor. Damage is induced by soil compaction, herbage removal and the resultant increase in soil temperature and evaporation from soil compaction, neroage removal and the resultant increase in soil temperature and evaporation from the soil, and physical damage to trees and shrubs. Observations indicate that season-long summer grazing is most detrimental. Management techgrazing is most detrimental. Management termiques that could prevent damage to woody species include alternating summer and winter use and changing the location of fences, watering places and salt stations. Prescribed fire may be useful for opening up shrub tickets or triggering sprout re-production. (Stihler-Mass) W79-02760

PLANT BIOMASS AND NET PRIMARY PRODUCTION ALONG A FLOOD-FREQUENCY GRADIENT IN THE STREAMSIDE FOREST, Illinois Univ. at Urbana-Champaign. Dept. of For-

F. L. Johnson, and D. T. Bell. Castanea, Vol. 41, No. 2, p. 156-165, June, 1976. 4 tab, 20 ref.

Descriptors: *Biomass, *Primary productivity, *Flood plain, *Vegetation, Streams, Forests, Wetlands, Ecological distribution, Trees, *Illinois.

Biomass and net annual primary production were calculated for three flood-frequency zones in the streamside forest coenocline. Aboveground bio-mass estimates were 290.0 t/ha in the lower flood plain, 142.1 t/ha in the occasionally flooded transiplann, 142.1 Una in the occasionally flooded transi-tion zone, and 234.2 t/ha in the upland. Above-ground net primary production estimates were 12.5 t/ha/yr in the flood plain, 8.0 t/ha/yr in the transi-tion zone, and 10.8 t/ha/yr in the upland. Data on the species distribution of biomass are presented. Biomass and primary production differences along the coenocline are considered to be the result of individual species responses to flooding, available water, disease, and timber cutting. (Stihler-Mass)

ECOSYSTEMS OF THE WORLD 1: WET COASTAL ECOSYSTEMS.

For primary bibliographic entry see Field 2L. W79-02762

INTRODUCTION; WET COASTAL ECOSYS-

Auckland Univ. (New Zealand). Dept. of Botany. For primary bibliographic entry see Field 2L. W79.02763

PHYSIOGRAPHY: WET COASTAL ECOSYS-

For primary bibliographic entry see Field 2L. W79.02764

SALT-MARSH ANIMALS: DISTRIBUTIONS
RELATED TO TIDAL FLOODING, SALINITY AND VEGETATION,

Delaware Univ., Newark. Coll. of Marine Studies; and Delaware Univ., Newark. Dept. of Biological

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 79-108. 7 fig. 10 tab, 114 ref.

Descriptors: *Salt marshes, *Wildlife habitats, *Aquatic animals, *Distribution patterns, Wetlands, Coastal marshes, Marsh plants, Salinity, Aquatic environment, Muskrats, Wildlife, Aquatic life, Mollusks, Birds, Shore birds, Crabs, Crustaceans, Invertebrates.

Few species have tolerance limits broad enough to accommodate the variable conditions of a salt marsh. As a general rule, more species can be found in those shallow water areas seldom exposed to the air and those terrestrial regions seldom inundated even by storm tides. Zonation within a marsh is largely determined by salimity gradients, degree of inundation, and character of the substrate. Salimity affects the distribution of a wide range of species including Foraminifera, fiddler crabs, fish eggs and larvae, marsh birds, and muskrat. It acts directly on the osmotic regulatory device of some organisms through immersion and on the drinking mechanisms on others. It also affects vegetative zonation which determines animal distributions through locations and kinds of food and the availability of nest and home sites. animal distributions through locations and kinds of food and the availability of nest and home sites. Sediment type and particle size of the substrate influences the distribution of most burrowing animals. The adaptive techniques used for survival varies greatly between the animal groups to be found in salt marshes. (See also W79-02762) (Steiner-Mass) W79-02767

THE COASTAL SALT MARSHES OF WEST-ERN AND NORTHERN EUROPE: AN ECO-LOGICAL AND PHYTOSOCIOLOGICAL AP-PROACH.

Delta Inst. for Hydrobiological Research, Yerseke (Netherlands)

For primary bibliographic entry see Field 2L. W79-02768

MANGALS AND SALT MARSHES OF EAST-ERN UNITED STATES,

Georgia Univ., Brunswick. Marine Resource Extension Center

For primary bibliographic entry see Field 2L. W79-02769

PLANT AND ANIMAL COMMUNITIES OF PACIFIC NORTH AMERICAN SALT MARSHES,

California Univ., Santa Barbara. Dept. of Geologi-For primary bibliographic entry see Field 2L. W79-02770

TIDAL SALT-MARSH AND MANGAL FORMA-TIONS OF MIDDLE AND SOUTH AMERICA, Louisiana State Univ., Baton Rouge.

For primary bibliographic entry see Field 2L.

AFRICA A. WET FORMATIONS OF THE AF-RICAN RED SEA COAST, Mansoura Univ. (Egypt). Dept. of Botany. For primary bibliographic entry see Field 2L.

AFRICA B. THE REMAINDER OF AFRICA: WET COASTAL ECOSYSTEMS, Auckland Univ. (New Zealand). Dept. of Botany. For primary bibliographic entry see Field 2L. W79-02773

OUTLINES OF ECOLOGY, BOTANY AND FORESTRY OF THE MANGALS OF THE

FURESTRY OF THE MANGALS OF THE INDIAN SUBCONTINENT,
Centre National de la Recherche Scientifique,
Toulouse (France). Inst. de la Carte Internationale
du Tapis Vegetal.
For primary bibliographic entry see Field 2L.
W79-02774

WET COASTAL FORMATIONS OF INDO-MA-LESIA AND PAPUA-NEW GUINEA, Auckland Univ. (New Zealand), Dept. of Botany. For primary bibliographic entry see Field 2L. W79-02775

MANGALS OF MICRONESIA, TAIWAN, JAPAN, THE PHILIPPINES AND OCEANIA, Kyushu Univ., Fukuoka (Japan). For primary bibliographic entry see Field 2L.

MANGAL AND COASTAL SALT-MARSH COMMUNITIES IN AUSTRALIA, Queensland Univ., Brisbane (Australia). Dept. of Botany. For primary nary bibliographic entry see Field 2L.

EXPLOITATION OF MANGAL, Environmental Research Lab., Gulf Breeze, FL. For primary bibliographic entry see Field 2L. W79-0278

HUMAN USES OF SALT MARSHES, Maryland Univ., College Park. Chesapeake Research Lab. For primary bibliographic entry see Field 2L. W79-02779

SALT MARSH PLANT GERATOLOGY, Georgia Univ., Brunswick. Marine Extension

Service.

M. A. Hardisky, and R. J. Reimold.
Science, Vol. 198, No. 4317, p 612-614, November 11, 1977. 1 fig, 1 tab, 6 ref.

Descriptors: *Salt marshes, *Aquatic plants, *Biomass, *Productivity, Biological communities, Plant growth, Wetlands, Marshes.

The seasonal and spatial contribution of individual culms to overall biomass and structure of several salt marsh plant communities can be quantified through measurements of height increments and number of leaves. The continual addition of plant tissue to the marsh system by individual culms indicates the independence of peak standing crop biomass from annual production. This effect was more pronounced in the southern latitudes where seasonal climatic changes are less abrupt in controlling plant growth and senescence. Residence time of leaves, continual culm mortality, and pulses of detritus export are species dependent and constitute the essential processes controlling primary production that ultimately dictates the value of each plant species to the ecosystem. (Howard-Mass) Mass) W79-02932

THE SEED BANKS OF PRAIRIE GLACIAL MARSHES.

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Water In Plants-Group 21

Iowa State Univ., Ames. Dept. of Botany and Plant Pathology. A. G. Van der Valk, and C. B. Davis. Canadian Journal of Botany, Vol. 54, No. 15, p. 1832-1838, August 1, 1976. 1 fig. 2 tab, 20 ref.

Descriptors: *Freshwater marshes, *Aquatic plants, *Seeds, Soil properties, Vegetation effects, Marshes, Wetlands.

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Sorensen's indices comparing the composition of seed banks within and among prairie glacial marshes ranged in value from 2 to 68%. Seed banks from different zones of the same marsh were more similar, with an average Sorensen's similarity index value of 41%, than seed banks from the same zone in different marshes where the average index values ranged from 24 to 28%. Differences among seed banks from marsh to marsh are due to differences in the vegetative composition of the marshes and the nature of the substrate. Allelopathic interactions in substrate samples with high amounts of organic matter may have resulted in either the inhibition of seed germination or the death of seedlings of several species. All marsh species were shown to be capable of dispersing to all zones of the marsh. (Howard-Mass)

RIFTING IN THE OKAVANGO DELTA, Columbia Univ., New York.
For primary bibliographic entry see Field 2H.
W79-02934

PLANT STANDING CROP AND PRODUCTIV-ITY RELATIONS IN A SCIRPUS-EQUISTUM WETLAND,

McGill Univ., Montreal (Quebec). Dept. of Biol-

ogy.
A. N. D. Auclair, A. Bouchard, and J.
Pajaczkowski.
Ecology, Vol. 57, No. 5, p. 941-952, Late Summer,
1976. 8 fig, 1 tab, 72 ref.

Descriptors: *Standing crops, *Primary productivity, *Rooted aquatic plants, *Marshes, Aquatic plants, Growth rates, Marsh plants, Soils, Nutrients, Nitrogen, Phosphorus, Potassium, Hydrogen ion concentrations, Seasonal, Litter, Decomposing organic matter, Wetlands.

organic matter, Wetlands.

Dry weight shoot biomass, species composition, structure (species density, diversity, height) and soil parameters were examined on 45 1-sq meter plots in an extensive marsh complex in southern Quebec, Canada. Dominant emergent species included Scirpus fluviatilis, Equisetum fluviatile, Scirpus validus, Phragmites communis, and Eleocharis palustris. Shoot net productivity averaged 6.10 g/sq m/day, and terminal standing crop was 345 g/sq m. Seasonal productivity showed a strong biomodal pattern with peaks occurring in late-July and mid-September. Two-thirds of annual litter production was lost by export. Complete decomposition of the remaining litter occurred within the next growing season. Soil K had the highest correlation with standing crop while soil N had the highest correlation with shoot net productivity. Soil P was negatively correlated with all production. While shoot density and standing drop followed trends in soil nutrients, they coincided more closely with soil anion (nitrogen, hydrogen) concentration. Shoot net productivity and standing correlated negatively with all measures of species diversity. (Stihler-Mass)

W79-02936

ASSESSMENT OF THE PHYSICAL AND BIO-LOGICAL CHARACTERISTICS OF THE MAJOR LAKE CHAMPLAIN WETLANDS, State Univ. of New York Coll. at Plattsburgh. For primary bibliographic entry see Field 2H. W79-02937

RELATIONS BETWEEN SOIL NUTRIENTS AND VEGETATION IN WETHEATHS, II, NU-TRIENT UPTAKE BY THE MAJOR SPECIES

IN THE FIELD AND IN CONTROLLED CON-DITIONS,
Imperial Coll, of Science and Technology, London
(England), Dept. of Botany.
For primary bibliographic entry see Field 2H.
W79-02939

PHOTOSYNTHETIC PROPERTIES AND ROOT CHILLING RESPONSES OF ALTITUDINAL ECOTYPES OF TYPHA LATIFOLIA L., Syracuse Univ., NY. Biological Research Labs. S. J. McNaughton, R. S. Campbell, R. A. Freyer, J. E. Mylroie, and K. D. Rodland. Ecology, Vol. 55, No. 1, p. 168-172, Winter, 1974. 3 fig. 6 tab, 25 ref.

Descriptors: *Cattails, *Ecotypes, *Altitude, Photosynthesis, Carbon dioxide; Temperature, Phosphorus, Roots, Ecology, Environmental gradient, Wetlands, Rooted aquatic plants.

Photosynthetic characteristics of two low-altitude and two high-altitude populations of the broad-leaved cattail (Typha latifolia L.) were compared. Light-saturation characteristics and light-saturated rates in normal air were identical. Although carbon dioxide saturation characteristics were simicarbon dioxide saturation characteristics were similar, photosynthetic rates at high CO2 concentrations (> 350 ppm in air) were higher in high-altitude ecotypes. Carbon dioxide compensation concentrations of the populations were similar over a wide range of temperatures. The effects of root chilling on water and phosphorus uptake were also compared in a low-altitude and a high-altitude ecotype. Root chilling reduced leaf water content and phosphorus uptake more in the low-altitude ecotype. The photosynthetic differences between the ecotypes seem to have minor ecological significance, but reductions in water and nutrient untake cance, but reductions in water and nutrient uptake upon root chilling suggest strong natural selection in the high-altitude site for ability to function effi-ciently in cold soils. (Stihler-Mass)

THE PRODUCTIVITY OF A RANGE OF BLANKET BOG VEGETATION TYPES IN THE NORTHERN PENNINES,

Northern Verninnes, Nature Conservancy, Alston (England). G. I. Forrest, and R. H. Smith. Journal of Ecology, Vol. 63, No. 1, p. 173-202, March, 1975. 9 fig. 13 tab, 16 ref, 1 append.

Descriptors: *Bogs, *Productivity, *Aquatic plants, Soil moisture, *Pennines, Wetlands, United Kingdom.

A two-fold variation in annual production of 481 to 868 g per sq m was determined between seven blanket bog sites representing a range of variation in floristic composition in the northern Pennines. The mean total annual net production for all seven sites was 659 + over - 53 g per sq m. Between-year variation was relatively small in comparison to that between sites. The sites with the highest production were those which had been recently burnt. For the remaining sites, assumed to be in a steady state situation, there was a trend of decreasing production with increasing wetness, reflecting ing production with increasing wetness, reflecting decreasing contribution of Calluna and Eriodecreasing contribution of Calluna and Erio-phorum vaginatum only partly replaced by in-creased Sphagnum growth on the wetter sites. Mean production per growing season day for the four Calluneto-Eriophoretum sites was 1.98 g per m. The total production of the 1215 ha of blanket bog within the Moor House National Nature Re-serve was estimated at 7,670,000 kg per year. (Howard-Mass) W79-02945

A MODEL OF STAND PHOTOSYNTHESIS FOR THE WET MEADOW TUNDRA AT BARROW, ALASKA,

San Diego State Univ., CA. Dept. of Biology. P. C. Miller, W. A. Stoner, and L. L. Tieszen. Ecology, Vol. 57, No. 3, p. 411-430, Late Spring, 1976. 13 fig, 4 tab, 62 ref.

Descriptors: *Tundra, *Model studies, *Aquatic plants, Photosynthesis, Radiation, Air temperature,

Soil temperature, Carbon dioxide, Humidity, Soil-water-plant relationships. Wetlands.

A model developed by the U.S. Tundra Biome, IBP, was used to simulate profiles of radiation, air temperature, humidity, plant water relations, and photosynthesis in the vascular plant canopy of the Wet Meadow Tundra. Of the incoming solar radiation, approximately 20% was reflected back and 32% to 53% absorbed by the canopy, increasing with leaf area index. Heat loss by convection was 5 to 10 times greater than loss due to evaporation. Total seasonal plant CO2 uptake ranged from 400 to 627 g per sq m of ground. Soil respiration was implied as a source of CO2. Photosynthesis increased with solar radiation, sire and ground temperature. implied as a source of CO2. Photosynthesis increased with solar radiation, air and ground temperatures, and air vapor density and decreased with increasing infrared radiation and root resistance to water uptake. Net photosynthesis was higher at the top of the canopy. After subtracting leaf growth costs, total accumulated CO2 became positive late in the season and was highest at lower canopy levels. Photosynthesis seemed adjusted to maximize carbon gain under the most frequent conditions but not under all or extreme conditions. W79-02946

NUTRIENT LIMITATIONS TO PLANT PRODUCTION IN TWO TUNDRA COMMUNITIES, Alberta Univ., Edmonton. Dept. of Botany.

R. W. Haag. Canadian Journal of Botany, Vol. 52, No. 1, p. 103-116, January, 1974. 2 fig, 10 tab, 65 ref.

Descriptors: *Tundra, *Productivity, *Nutrients, Phosphorus, Soil moisture, Soil temperature, Arctic, Lowland meadow, Wetlands.

Response to nitrogen fertilization in a lowland wet sedge meadow and an upland birch-willow-heath-community, including increased protein content and dry weight productivity, indicates nitrogen supply limits production in both soils. Phosphorus supply does not limit production in the upland supply does not limit production in the upiand community, but dilution of the soil solution in the lowland meadow may decrease phosphorus availa-ble and cause this element to become limiting. Low-soil temperature exerts an indirect limitation on plant production through reduction of the rates of organic matter decomposition and microbial nitrifi-cation, thus limiting the rate of nitrogen cycling. Available nitrogen can be taken up and metabo-lized despite low soil temperatures which, along with nitrogen availability, directly limit phospho-rus metabolism. The importance of a low nutrient rus metabolism. The importance of a low nutrient regime in the Arctic may be seen in the widespread occurrence of zenomorphic characters in many taxa, which require minimal mineral nutrition to best use their photosynthetic capacity. The low nutrient regime may partially explain the high proportion of perennial plants since these species can accumulate a nutrient pool over time from a deficient environment. (Howard-Mass) W79-02947

STUDIES OF THE INVERTEBRATE FAUNA OF A WET SLACK IN A SAND DUNE SYSTEM, For primary bibliographic entry see Field 2L. W79-02948

INFLUENCES OF SPRING WATER LEVELS ON AQUATIC AND RIPARIAN PLANT DIS-TRIBUTION IN UPPER RICHELIEU AND MISSISQUOI BAY AREAS,

Quebec Univ., Montreal. Dept. of Biological Sci-

For primary bibliographic entry see Field 2H. W79-02950

BIOLOGICAL FOUNDATIONS OF FOREST DRAINAGE EFFICIENCY, Akademiya Nauk SSSR, Moscow. Lab. of Forest

Sciences.

S. E. Vompersky.

Available from the National Technical Information Service, Springfield, VA 22161 as FB-273 902, Price codes: A17 in paper copy, A01 in microfiche. Indian National Scientific Documentation Centre,

Group 21-Water In Plants

New Delhi, 1977. 380 p, 58 fig, 78 tab, 280 ref. Translated from Russian

Descriptors: *Bogs, *Drainage effects, Wetlands, Peat, Drainage, Habitats, Trees, Succession.

The principles of stand growth on drained peat and bog soils are discussed and the ecological-biologi-cal causes of varying drainage efficiency deter-mined. When correctly implemented, the efficiencan clauses of varying dramage efficiency of drainage of boggy forests depends on the physical and chemical properties of the peat soils. The most important indices which determine the utility of peat soils for purposes of forest reclamation are ash content, botanical composition, and bulk density of peat. The important factors contributing to the improved growth of stands on drained bogs are: (1) total elimination of stanmer inundations and necrosis of roots, normalization of metabolism of trees, (2) increase in concentration of nutrient reserves in the root-inhabited layer of the soil because of its increased bulk density, (3) creation of favorable water and gas regime as also oxidation of toxic compounds in the relatively deep soil layers which were consantly or partly inundated earlier, and (4) increase in the thickness inundated earlier, and (4) increase in the thickness of the root-inhabited layer and improvement in the distribution of roots along the soil profile. (Steiner-Mass) W79-02951

WETLAND HABITAT EVALUATION, VAN-COUVER LAKE, WASHINGTON, Jones and Stokes Associates, Inc., Sacramento,

CA

For primary bibliographic entry see Field 2H. W79-02952

A PRELIMINARY CLASSIFICATION OF WET-LAND PLANT COMMUNITIES IN NORTH-CENTRAL MINNESOTA, Fish and Wildlife Service, Jamestown, ND. North-

ern Prairie Wildlife Research Center.
L. M. Cowardin, and D. H. Johnson.

L. M. Cowardin, and D. H. Johnson. For sale by the Superintendant of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Stock No. 2410-00358. Fish and Wildlife Service, Special Scientific Report-Wildlife No. 168, 1973. 33 p, 1 fig, 7 tab, 14 ref, 15 append.

Descriptors: *Wetlands, *Minnesota, *Classifica-tion, Freshwater marshes, Marsh plants, Distribu-tion patterns, Wildlife habitat, Waterfowl.

A classification of wetland plant communities was developed for a study area in northcentral Minnedeveloped for a study area in northcentral Minne-sota in order to analyze data on waterfowl use of habitat that were gathered by radio telemetry. The classification employs features of several earlier classifications in addition to new classes for bogs and lakeshore communities. Brief descriptions are given for each community, and the important plant species are listed. Discriminant function analysis was used for 40 plant species. Seventy-five percent of the stands studied were classified correctly by this technique. Average probabilities of assignment to communities were calculated and helped to identify distinct and poorly defined communities as identify distinct and poorly defined communities as well as the relationship among communities. (Steiner-Mass) W79-02956

PLANT COMPETITION FOR ATRAZINE, Nebraska Univ., Lincoln. Dept. of Agronomy For primary bibliographic entry see Field 5A.

RESISTANCES TO WATER TRANSPORT IN

RICE PLANIS, Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). V. S. Tomar, and B. P. Ghidyal. Agronomy Journal, Vol. 67, No. 2, p 269-272, March-April 1975. 3 fig, 1 tab, 12 ref.

Descriptors: *Rice, *Transpiration, Soil-waterplant relationships, Irrigation, Irrigation practices, Flooding, Cultivation, *Cultural practices.

Rice is grown either in continuously flooded 'low-land' soils or under rainfed conditions in 'upland' soils. The objective of the study was to determine whether there are differences in resistance to water transport between plants grown in flooded and nonflooded soils. This information may be useful in understanding the plant-water relations under two cultural practices. The resistance to water transport in the non-flooded plants was nearly twice as high as in the flooded plants. The gradient between leaf and soil water potential increased markedly when plants were exposed to high air saturation deficit, however, the transpiration rate remained almost constant. These studies indicate the existence and development of large resistances to water transport in rice plants. (Skogerboe-Colo St) W79-02986 W79-02986

THE RECOVERY OF LEAF WATER POTENTIAL, TRANSPIRATION, AND PHOTOSYNTHESIS OF COTTON DURING IRRIGATION CYCLES

Volcani Inst. of Agricultural Research, Bet-Dagan (Israel)

For primary bibliographic entry see Field 2D. W79-02990

RESPONSES OF BERMUDAGRASS TO SALIN-

California Univ., Riverside. Dept. of Plant Sci-For primary bibliographic entry see Field 3C.

2J. Erosion and Sedimentation

W79-02993

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION, COMPOSITION, AND TRANSPORT OF MICROBIAL BIOMASS AND SUSPENDED MATERIAL IN A SALT MARSH ECOSYSTEM, South Carolina Univ., Columbia.

For primary bibliographic entry see Field 5B. W79-02673

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF NUTRIENTS, A RAINFALL SIMU-

LATION STUDY,
Iowa Natural Resources Council, Des Moines. For primary bibliographic entry see Field 4C. W79-02680

A DEVICE TO COLLECT SUPERNATANT WATER FROM MEASUREMENT OF THE FLUX OF DISSOLVED COMPOUNDS ACROSS SEDIMENT SURFACES,

Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.

For primary bibliographic entry see Field 5A. W79-02686

SUSPENDED SEDIMENT AND BED MATERIAL STUDIES ON THE LOWER MISSISSIPPI RIVER,

Army Engineer District, Vicksburg, MS. Potamology Section. For primary bibliographic entry see Field 8B.

PHYSIOGRAPHY; WET COASTAL ECOSYS-

For primary bibliographic entry see Field 2L. W79-02764

W79-02703

DISSOLUTION POTENTIAL OF SURFICIAL MANCOS SHALE AND ALLUVIUM, Colorado State Univ., Fort Collins.

For primary bibliographic entry see Field 5B. W79-02827

SOIL AND WATER LOSS FROM CONSERVA-TION TILLAGE SYSTEMS, Science and Education Administration, Ames, IA. North Central Region. For primary bibliographic entry see Field 3F. W79-02852

SILT SAMPLING STUDY, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville,

For primary bibliographic entry see Field 8D. W79-02861

AN INEXPENSIVE AND EASILY FABRICATED SAMPLER FOR COLECTING SEDIMENT CORES TO MEASURE EH POTENTIALS, University of West Floida, pensacola. Faculty of

For primary bibliographic entry see Field 7B. W79-02917

CONTRIBUTION OF CHRONIC PETROLEUM INPUTS TO NARRAGANSETT BAY AND RHODE ISLAND SOUND SEDIMENTS, Rhode Island Univ., Kingston, Graduate School of Oceanography.
For primary bibliographic entry see Field 5B.
W79-02942

HIGH-MAGNESIUM CALCITE OOIDS FROM THE GREAT BARRIER REEF,

Bureau of Mineral Resources, Geology and Geo-physics. Canberra (Australia). For primary bibliographic entry see Field 2L W79-02999

2K. Chemical Processes

AN OVERVIEW OF NUTRIENT CYCLING RE-SEARCH AT COWEETA HYDROLOGIC LABO-RATORY.

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. For primary bibliographic entry see Field 4D. W79-02571

FOREST SERVICE STUDIES OF SOIL AND NUTRIENT LOSSES CAUSED BY ROADS, LOGGING, MECHANICAL SITE PREPARA-TION, AND PRESCRIBED BURNING IN THE

SOUTHEAST,
Southeastern Forest Experiment Station, Franklin,
NC. Coweeta Hydrologic Lab.
For primary bibliographic entry see Field 5B.
W79-02572

SIMULATION OF POTENTIAL EFFECTS OF FOREST UTILIZATION ON THE NITROGEN CYCLE IN DIFFERENT SOUTHEASTERN ECOSYSTEMS,

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. For primary bibliographic entry see Field 4D. W79-02573

NUTRIENT BUDGETS FOR UNDISTURBED AND MANIPULATED HARDWOOD FOREST ECOSYSTEMS IN THE MOUNTAINS OF NORTH CAROLINA,

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. For primary bibliographic entry see Field 4D. W79-02574

INVESTIGATION OF ISOTHIOCYANATOPENTAAQUOCHROMIUM (III) AS A REAGENT FOR THE SEPARATION AND IDENTIFICATION OF NANOGRAM QUANTITIES OF MERCURY (I), MERCURY (ID, AND METHYLMERCURY (II), North Dakota Univ., Grand Forks. Dept. of

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TRACI Bedfor Scotia) Estuari 2, p 14

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Chemical Processes—Group 2K

For primary bibliographic entry see Field 5A. W79-02589

PREDICTION OF HYDRAULIC CONDUCTIV-ITY CHANGES USING SOIL CHARACTERIS-TICS,

Arizona Univ., Tucson. Dept. of Hydrology and Water Resources. For primary bibliographic entry see Field 2G. W79-02600

CATHODIC STRIPPING METHODS FOR THE DETERMINATION OF PHOSPHATE AND ARSENATE IN NATURAL WATERS,

Southern Illinois Univ. at Carbondale.
For primary bibliographic entry see Field 5A. W79-02602

TRANSFORMATIONS OF ORGANIC PHOSPHORUS SUBSTRATES IN SOILS AS EVALUATED BY NAHCO3 EXTRACTION,

Agricultural Research Service, Fort Collins, CO. R. A. Bowman, and C. V. Cole. Soil Science, Vol. 125, No. 1, p 49-54, January, 1978. 1 fig. 4 tab, 20 ref.

Descriptors: Chemical analysis, Organic compounds, Sodium compounds, Inorganic compounds, *Phosphorus compounds, Soil chemistry, Incubation, *Sodium bicarbonate

The sodium-bicarbonate method of Olsen et al. (1954) was primarily designed to extract inorganic P (Pl) and to correlate this P-pool with plant response. This procedure was used to follow the transformations of organic P (PO) substrates in soil. Various commercial PO substrates were added to a sandy loam soil, and were extracted immediately and after 1 to 18 days of incubation at field capacity. Glucerophosphate and all 3 muckey. field capacity. Glycerophosphate and all 3 nucleo-tide components of RNA were completely miner-alized and accounted for in the NaHCO3 solution after 3 days. While RNA degraded in 18 days, after 3 days. While RNA degraded in 18 days, sodium inositol hexaphosphate (Na-phytate) was relatively unaffected during this time and unrecoverable in the NaHCO3 solution upon immediate extraction. Thus, the labile compounds, like RNA, its four 3' nucleotides, and glycerophosphates were recoverable in the 0.5M NaHCO3-extracting solution (pH 8.5) of Olsen et al., while the Na-phytate, a relatively resistant compound, was not. Native Po was only slightly affected, however. A relatively constant amount of native Po was extracted, irrespective of extraction periods lasting 0.5 to 6 h. (Skogerboe-Colorado State)

A DEVICE TO COLLECT SUPERNATANT WATER FROM MEASUREMENT OF THE FLUX OF DISSOLVED COMPOUNDS ACROSS SEDIMENT SURFACES,

Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.

For primary bibliographic entry see Field 5A. W79-02686

TRACE METALS IN THE WATERS OF A PAR-TIALLY MIXED ESTUARY,

HALLY MIXED ESTUARY, Bedford Inst. of Oceanographic Lab. J. M. Bewers, and P. A. Yeats. Estuarine and Coastal Marine Science, Vol. 7, No. 2, p 147-162, August 1978. 7 fig, 2 tab, 34 ref.

Descriptors: *Trace metals, *Estuaries, *Canada, *On-site data collections, Heavy metals, Turbidity, Water analysis, Chemical analysis, Iron, Manganese, Cobalt, Copper, Zinc, Salinity, Data collections, Suspended solids, Water quality, Mixing, Intertidal areas, Cadmium, Distribution, Spatial distribution, Dissolved solids, *St. Lawrence Estuaries.

The distributions of the trace metals iron, manganese, cobalt, nickel, copper, zinc, and cadmium in the upper St. Lawrence estuary were determined. The most important influence upon the distribution and behavior of the metals, apart from the character of the mixing between fresh and saline source waters, is the distribution and transport of suspended particulate matter. The estuarine turbidity maximum, which contains suspended particles enriched in cobalt relative to particles within both marine and river source waters, modifies the distribution of metals in the estuary and influences the character of the mixed outflowing water of salinity up to 20 parts per thousand. The influence of the turbidity maximum, which appears to be formed by particle trapping and the periodic settling and resuspension of sedimentary material, however, is confined to the estuary. Although the incoming and outgoing fluxes of suspended particulates in water are balanced, significant proportions of the influxes of iron (12%), manganese (19%), copper (24%), cobalt (27%), and zinc (44%) are removed within the system. The losses of iron, manganese, and cobalt occur predominantly at the expense of their particulate fractions. Suspended matter leaving the estuary in mixed surface water is depleted in magnese and cobalt. Suspenden that the losses of particulate fractions. Suspended matter leaving the estuary in mixed surface water is depleted in manganese and cobalt, suggesting that the losses of these metals within the estuary occur primarily through the removal of exchangeable metal from riverborne particles within the turbidity maximum. (Humphreys-ISWS) W79-02687

SIMULATION OF NUTRIENT LOSS FROM SOILS DUE TO RAINFALL ACIDITY.

Corvallis Environmental Research Lab., OR For primary bibliographic entry see Field 5B. W79-02730

ANALYSIS AND CHARACTERIZATION OF TRACE ELEMENTS IN SHALE OIL PROD-UCTS BY INSTRUMENTAL NEUTRON ACTI-VATION ANALYSIS,

Missouri Univ.-Columbia. Dept. of Chemistry. For primary bibliographic entry see Field 5A. W79-02822

DISSOLUTION POTENTIAL OF SURFICIAL MANCOS SHALE AND ALLUVIUM, Colorado State Univ., Fort Collins.

For primary bibliographic entry see Field 5B. W79-02827

PH FLUCTUATION IN AN INTERTIDAL BEACH IN BERMUDA, Innsbruck Univ. (Austria). Inst. fuer Zoophysiolo-

For primary bibliographic entry see Field 2L. W79-02842

A RAPID AND PRECISE METHOD FOR DE-TERMINING SULFATE IN SEAWATER, ES-TUARINE WATERS, AND SEDIMENT PORE

Woods Hole Oceanographic Institution, MA. Joint Program in Biological Oceanography.
R. W. Howarth.

Limnology and Oceanography, Vol. 23, No. 5, p 1066-1069, September 1978. 2 tab, 11 ref. NSF OCE74-17859, DEB76-83877.

Descriptors: *Sulfates, *Chemical analysis, *Sea water, *Pore water, Water chemistry, Sediments, Salt marshes, Estuaries, Salinity, Chemicals, Volumetric analysis, Analytical techniques, Chemistry.

Sulfate can be rapidly and accurately measured by means of an indirect titration. Barium sulfate is precipitated in acid EDTA solution, the precipitate filtered and dissolved in an excess of EDTA at high pH, and the excess EDTA titrated with MgC12. Interferences from chloride, iron, or phosphate are negligible. Sulfides may interfere, but there is a procedure to remove this interference. The method determines the sulfate concentration in 1.0 ml of seawater with a standard deviation

consistently less than 0.5% of the mean determina-tion of three replicates. (Sims-ISWS) W79.02846

MICROFLUOROMETRIC METHOD TO MEASURE AMMONIUM IN NATURAL

Skidaway Inst. of Oceanography, Savannah, GA. W. S. Gardner

Limnology and Oceanography, Vol. 23, No. 5, p 1069-1072, September 1978. 4 fig, 12 ref. NSF OCE75-06423.

Descriptors: *Ammonia, *Water chemistry, *Chemical analysis, *Fluorometry, Analytical techniques, Chemical reactions, Sea water, Pore water, Fluorescence, Laboratory tests, Ions, Chemicals, Colorimetry, Chemistry.

Ammonium can be measured fluorometrically after Ammonium can be measured fluorometrically after a simple chromatographic separation from amino acids and reaction with o-phthalaldehyde. The method (less than 0.5-ml sample required) is sensitive down to 0.2 micrometer NH4(+) in seawater. Fluorescence is proportional to concentration over the range of 0-100 micrometer NH4(+), and analysis time is 6 min per sample. (Sims-ISWS) W70-02847

DETERMINATION OF SUBMICROMOLAR CONCENTRATIONS OF AMMONIA IN NATURAL WATERS BY A STANDARD ADDITION METHOD USING A GAS-SENSING ELEC-TRODE,
Bigelow Lab. for Ocean Sciences. Boothbay

Harbor, ME.

C. Garside, G. Hull, and S. Murray. Limnology and Oceanography, Vol. 23, No. 5, p 1073-1076, September 1978. 2 fig, 10 ref. NOAA 04-7-022-4404.

Descriptors: *Ammonia, *Water chemistry, *Chemical analysis, Analytical techniques, Electrodes, Methodology, Chemicals, On-site investigations, Laboratory tests, Water pollution, Pollutants, Chemistry, Gas-sensing electrodes.

A standard addition technique using a gas-sensing electrode with a modified electrode filling solution provides a rapid and convenient method suitable for both field and laboratory measurement of ammonia. The method has a detection limit of 0.2 micro M of NH3, a precision of + or 0.1 micro M of NH3, and no measurable salt error. Calibration is stable for a period of days, and analytical rates of 15 samples per hour are possible. (Sims-ISWS)

SOLAR MIDDLE ULTRAVIOLET (UV-B) MEA-SUREMENT IN COASTAL WATERS RICH IN YELLOW SUBSTANCE,

Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.

For primary bibliographic entry see Field 2L. W79-02849

MULTIMODE MODELING OF THE WATER MOLECULE,

Science Applications, Inc., La Jolla, CA. For primary bibliographic entry see Field 1A. W79-02859

OPTICAL CONSTANTS IN THE INFRARED FOR K2SO4, NH4H2PO4' AND H2SO4 IN WATER.

WATER,
Missouri Univ.-Kansas City. Dept. of Physics.
M. R. Querry, R. C. Waring, W. E. Holland, L. M.
Earls, and M. D. Herrman.
Journal of the Optical Society of America, Vol. 64.
No. 1, p 39-46, January 1974. 7 fig. 3 tab. 24 ref.
OWRT A-030-MO(5), A-063-MO(2), 14-31-00013025, 3225 and 3825.

Descriptors: Infrared, Reflectance, Spectroscopy, Aqueous solutions, Potassium sulfate, Hydrogen sulfate.

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Group 2K-Chemical Processes

Relative, specular reflectances of individual 0.5M aqueous solutions of K2SO4 and NH4H2PO4 and of 3M H2SO4 were measured in the 2-20 micrometer region of the infrared for polarized radiant flux having the electric field vector perpendicular to the plane of incidence. Distilled water was the reflectance standard. The angle of incidence was 70.03 deg + or - 0.23 deg. Kramers-Kronig analysis of the relative reflectance spectra provided phase difference spectra for the aqueous solutions and a tabulation of spectral values relative to air for the index of refraction and extinction coefficient. The strengths of selected infrared bands of the solutes were determined by integrating values for the molecular extinction coefficients over the spectral regions of the bands.

THE EFFECT OF ORGANIC CARBON ON THE CONCENTRATIONS OF IRON AND HYDROGEN SULFIDE IN GROUND WATER, Missouri Univ.-Columbia. Dept. of Geology. For primary bibliographic entry see Field 5A. W79-02908

CHEMICAL LIMNOLOGY OF THE NORTH CHANNEL, 1974, Department of Fisheries and Environment, Bur-

lington (Ontario). Water Quality Branch For primary bibliographic entry see Field 5A. W79-02921

HIGH-MAGNESIUM CALCITE OOIDS FROM THE GREAT BARRIER REEF.

Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). For primary bibliographic entry see Field 2L.

2L. Estuaries

A REPORT ON THE CONCENTRATION, DISTRIBUTION AND IMPACT OF CERTAIN TRACE METALS FROM SEWAGE TREATMENT PLANS ON THE CHESAPEAKE BAY, Chesapeake Research Consortium, Inc., Annapolis, MD MD

For primary bibliographic entry see Field 5B. W79-02511

ENVIRONMENTAL ASSESSMENT - ALTERNATIVES OF GENERAL MANAGEMENT PLAN AND WILDERNESS STUDY FOR CAPE LOOKOUT NATIONAL SEASHORE, NORTH

National Park Service, Denver, CO. Denver Service Center.

For primary bibliographic entry see Field 6G. W79-02525

COASTAL ZONE MANAGEMENT APPROVAL REGULATIONS,
For primary bibliographic entry see Field 6E.

W79-02535

AN ASSESSMENT OF THE OCCURRENCE OF HUMAN VIRUSES IN LONG ISLAND AQUAT-IC SYSTEMS

Brookhaven National Lab., Upton, NY. For primary bibliographic entry see Field 5C. W79-02584

ECOLOGICAL EFFECTS OF AN ARTIFICIAL ISLAND, RINCON ISLAND PUNTA GORDA, CALIFORNIA,

Dames and Moore, Los Angeles, CA. For primary bibliographic entry see Field 6G. W79-02614

CHEMICAL AND BIOLOGICAL SURVEY OF LIBERTY BAY, WASHINGTON, Environmental Protection Agency, Seattle, WA.

For primary bibliographic entry see Field 5C. W79-02634

EFFECTS OF BOTTOM SEDIMENTS ON IN-FILRATION FROM THE MIAMI AND TRIBU-TARY CANALS TO THE BISCAYNE AQUIFER, DADE COUNTY, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-sources Div.

For primary bibliographic entry see Field 5B. W79-02653

PRELIMINARY EVALUATION OF THE SPRING-RIVER SYSTEM IN WEEKI WACHEE AREA AND THE LOWER WITHLACOOCHEE RIVER, WEST-CENTRAL FLORIDA, Geological Survey, Tallahassee, FL. Water Resources Div.

For primary bibliographic entry see Field 4B. W79-02655

THE GENETIC BASIS OF THE ECOLOGICAL AMPLITUDE OF SPARTINA PATENS ON THE OUTER BANKS OF NORTH CAROLINA, Duke Univ., Durham, NC. Dept. of Botany. J. A. Silander, Jr. PhD Dissertation, 1976, 292 p.

Descriptors: *Marsh plants, *Genetics, *Physiological ecology, Wetlands, Salt marshes, Grasses, *North Carolina, Resistance, Salt tolerance.

Reciprocal and common garden transplantations of Spartina patens genets sampled along a transect of Codd's Creek, North Carolina, were employed in an analysis of evolutionary limits to species distributions. These studies revealed significant divergence among adjacent dune, swale, and marsh subpopulations for a variety of morphometric characters including number and size of fertile and vegetative culms, leaf size, flowering date, and seed production. Significant divergence among subpopulations was revealed in physiological traits. Dune genets were more salt and drought tolerant and elicited a better response to low nutrient conditions. Marsh genets were less salt and drought tolerant and responded better to high nutrients than other genets. Swale genets were intermediate. Genetic variance in morphometric and physiological traits decreased slightly from marsh to dune. Gene flow was shown to be restricted among subpopulations as a result of differences in flowering time, selfing, and distance. Some migration was subpopulations as a result of differences in flowering time, selfing, and distance. Some migration was
possible, particularly with respect to the swale
subpopulation. Nonadaptive correlations were
found among some characters under simultaneous
selection in different subpopulations. These forces
contribute simultaneously to a lower fitness of
genets in the swale and dune subpopulations, thereby retarding evolution. (Steiner-Mass) W79-02669

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION, COMPOSITION, AND TRANSPORT OF MICROBIAL BIOMASS AND SUSPENDED MATERIAL IN A SALT MARSH ECOSYSTEM,

South Carolina Univ., Columbia. For primary bibliographic entry see Field 5B. W79-02673

ENVIRONMENTAL FACTORS LIMITING THE DISTRIBUTION OF FIVE PLANT SPECIES ON SALT MARSHES OF ISLAND BEACH, NEW

SALI MARSHES Of Links, New Brunswick, NJ. Dept. of Botany.
C. S. Rietsma.

PhD Dissertation, October 1976. 112 p.

Descriptors: *Salt marshes, *Marsh plants, *Ecological distribution, *Limiting factors, Wetlands, Tidal marshes, *New Jersey, Distribution patterns, Plant growth, Environmental

effects, Beach(NJ) Environmental gradient, *Island

Beach(NJ).

Six communities were distinguished by their respective dominant species: tall growth form of Spartina alterniflora, short growth form of S. alterniflora, Spartina patiens, Distichlis spicata, Salicornia virginica, and Juncus gerardi. The level on the marsh at which each community was growing and the duration and depth of tidal flooding in each community was determined. Soil samples were collected during one growing season and determinations made of salinity; moisture content; organic matter content; water soluble chloride, sulfate, sodium, potassium, calcium, and magnesium; exchangeable sodium, potassium, calcium, and magnesium; cation exchange capacity; and acidity. Transplants of S. Patens, D. spicata, S. virginica, and J. gerardi did not survive well when moved into the tall and short S. alterniflora grew poorly when moved into all communities. Transplants of tall and short S. alterniflora grew poorly when moved into all communities occurring at higher elevations. Results of this research indicate that soil salinity and moisture may limit the five salt marsh species. S. patens, D. spicata, and J. gerardi may be limited by high salinities early in the growing season at low elevations in the marsh. (Steiner-Mass) W79-02678

VOLATILE CHLORO- AND BROMOCARBONS IN COASTAL WATERS,

Maryland Univ., College Park, Dept. of Chemis-For primary bibliographic entry see Field 5B.

W79-02684

TRACE METALS IN THE WATERS OF A PAR-TIALLY MIXED ESTUARY.

Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab. For primary bibliographic entry see Field 2K. W79-02687

A NOTE ON THE CIRCULATION INDUCED BY A SHALLOW-SEA FRONT,

Institute of Oceanographic Sciences, Birkenhead (England). I. D. James

Estuarine and Coastal Marine Science, Vol. 7, No. 2, p 197-202, August 1978. 4 fig, 11 ref.

Descriptors: *Density currents, *Coasts, *Upwelling, *Mathematical models, Water circulation, Analytical techniques, Equations, Density stratification, Oceans, Model studies, Currents(Water), Stratified flow, Foreign research, *Celtic Sea,

The density current induced by a front which is a transition between well-mixed and stratified water was examined by means of a two-dimensional numerical model. It was shown that this may cause a convergence and upwelling near the front, which could have important biological consequences, together with a flow along the line of the front. (Humphreys-ISWS) W79-02688

SUSPENDED SEDIMENT AND BED MATERIAL STUDIES ON THE LOWER MISSISSIPPI

Army Engineer District, Vicksburg, MS. Potamology Section. For primary bibliographic entry see Field 8B. W79-02703

HYDRAULICS AND DYNAMICS OF NEW CORPUS CHRISTI PASS, TEXAS: A CASE HIS-

Texas Univ. at Austin, Port Aransas. Marine Science Inst. For primary bibliographic entry see Field 8B.

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Estuaries—Group 2L

SOLUTION OF COUPLED NONLINEAR ECO-SYSTEM EQUATIONS.

Hawaii Univ., Honolulu, Dept. of Ocean Engineer-

ing. G. C. Niemeyer. Journal of the Environmental Engineering Divi-sion, Proceedings of the American Society of Civil Engineers, Vol. 104, No. EE5, p 849-861, October 1978. 5 fig, 12 ref.

Descriptors: *Water quality, *Estuaries, *Mathematical models, *Simulation analysis, *Ecosystems, Stability, Basins, Equations, Systems analysis, Finite elements, Finite differences, Nonlinearity, Physiography, Computation, Trophic level, *Kaneohe Bay(Oahu), *Hawaii.

An efficient procedure for solving an arbitrary number of coupled, nonlinear, vertically integrated transport equations can be achieved by exploiting unique features of both finite difference and finite element methods. A technique is derived that attains this end, and it is used in a preliminary simulation of a marine ecosystem. The technique is apparently independent of stability criteria, and as a result, the time-step can be determined by the time-scales of the physical and biological processes simulated or by the time-step of a compatible hydrodynamic model. The method does not require linearization of the governing equations, and the biological interaction terms therefore retain their inherent nonlinearity. The computational cost is determined primarily by the physiography of the basin, rather than by the number of component equations. Thus, relatively comprehensive ecosystems can be readily modeled. (Bell-Cornell)

ECONOMIC INCENTIVES FOR INSTITUTIONAL CHANGE: THE CASE OF THE VIRGINIA WETLANDS ACT,

Virginia Polytechnic Inst. and State Univ., Blacks-burg. Dept. of Agricultural Economies. For primary bibliographic entry see Field 6E. W79-02721

AN ECOLOGICAL STUDY OF EPIPSAMMIC DIATOMS FROM SEDIMENTS ASSOCIATED WITH JUNCUS ROEMERIANUS IN A NORTHWEST FLORIDA SALT MARSH,

Florida State Univ., Tallahassee. Dept. of Biologi-T. L. Hart. PhD Dissertation, June, 1977. 191 p.

Descriptors: *Salt marshes, *Florida, *Diatoms, Wetlands, Marshes, Sediments, Aquatic microorganisms, Chrysophyta, Organic compounds, Distribution patterns, Growth.

Epipsammic diatoms dominated the sand grain microflora within the maximum quantities of living diatom occurring at the sediment surface. From the surface the number of diatoms per sand grain decreased with depth until a minimum was reached at 5 cm. At this depth and below isolated pockets of diatoms did exist but were few in numbers. Variations in the quantities of living diatoms per sand grain and attached frustules were observed both in the horizontal and vertical planes. Natural communities of epipsammic diatoms induced with glucose took up the substrate at concentrations comparable to the affinity values obtained by laboratory cultures in uptake experiments. Isolated epipsammic diatoms incorporated a variety of organic compounds of heterotrophic growth. Among the 30 compounds tested, 15 were capable of supporting growth in one or more of the seven test diatoms. However, only glucose, lactate, and fructose supported heterotrophic growth in five or more test cultures. The majority of organic compounds were capable of supporting growth in only one or two species with no one species dominant. Eight nitrogen compounds were tested of which only ammonium chloride and qultamate provided Eight nitrogen compounds were tested of which only ammonium chloride and gultamate provided aitrogen at an adequate level for growth in all seven species. (Steiner-Mass)

LINEAR PROGRAMMING MODEL TO QUANTIFY ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUES OF A TIDAL MARSH, Columbia Univ., New York. School of Engineering and Applied Science.

For primary bibliographic entry see Field 6B. W79-02723

BIRD USE OF ANAHEIM BAY: A SOUTHERN CALIFORNIA SALT MARSH,
California State Univ., Long Beach, Dept. of Biol-

ogy. P. D. Romero. M.S. Thesis, 1976. 174 p.

Descriptors: *Salt marshes, *California, *Birds, *Census, Wetlands, Coastal marshes, Wildlife habitat, Wildlife, Shore birds, Water birds, Rails, Migratory birds, Waterfowl, Animal populations.

A study made of Anaheim Bay, a coastal salt marsh, documented its utilization by resident and migratory birds. Some 123 species of birds were observed in the area. Eighty-three species were censused, and their use of habitats within the bay were analyzed. Anaheim Bay is an important wintering area for shorebirds, waterfowl, and other water-associated birds. Highest bird numbers occurred in late December and lowest in July. Use of habitats within the area was highly dependent on tidal conditions and less so on time of day and on weather conditions. Four endangered species-California Brown Pelican, California Least Tern, Light-footed Clapper Rail, and Belding's Savannah Sparrow-inhabit Anaheim Bay. Four species were found to breed within the marsh. (Steiner-Mass) W79-02724

SALT MARSHES OF THE ALASKA PACIFIC

COAST, Rutgers - The State Univ., NJ. Dept. of Botany. Newark.
J. H. Crow

J. H. Crow.

In: Proceedings of the Symposium on Terrestrial and Aquatic Ecological Studies of the Northeast, Andrews, R. D. (ed.). Ecological Society of America and the Northwest Scientific Association, Eastern Washington State College, Cheney, p. 103-110, 1977. 1 fig, 1 tab, 12 ref.

Descriptors: *Salt marshes, *Alaska, Wetlands, Marsh plants, Distribution patterns.

From Juneau to Cook Inlet there are thousands of hectares of salt marshes where human disturbance is uncommon. A few of these marshes extend for more than 50 kilometers along the coastline while hundreds of small marshes cover only a few hectares. Very sharp boundaries exist between nearly all communities and are a characteristic feature of the marshes. Community and species diversity is often high; some communities having 20 or more flowering plant species in a square meter. The marshes are important to many kinds of animals and may serve as useful references in baseline studies. (Steiner-Mass)

THE SALT MARSH VEGETATION OF CHINA POOT BAY, ALASKA,
Rutgers - The State Univ., Newark, NJ. Dept. of

J. H. Crow, and J. D. Koppen.

In; Environmental Studies of Kachemak Bay and Lower Cook Inlet. Trasky, L., and Burbank, D. (eds.). Alaska Department of Fish and Game, Juneau, Alaska. Vol. II, p 716-744. 1977. 2 fig, 6 tab, 10 ref.

Descriptors: *Salt marshes, *Alaska, *Marsh plants, Wetlands, Distribution patterns, Grasses, Detritus, Marshes, Coastal marshes, Oil waters, *China Poot Bay(Alas).

Over 240 ha of salt marsh exists in China Poot Bay. The great majority of the marshland is covered by grass/succulent vegetation that is subject to frequent inundation by salty water or grows in habitats that accumulate salts. The dominance of Puc-

cinellia hultenii-Comprises appears to distinguish the marshland from other marshes of comparable size that exist along the southcentral and southeast-ern regions of Alaska. Due to the nature of the vegetation and strong tidal influences, it is believed that oil spill damage in the vicinity of the bay presents a substantial hazard. Tidal removal of presents a substantial hazard. Tidal removal of litter-detritus from the marsh appeared to be very high. Itj is hypothesized that this may be an impor-tant facet of the highly productive marine ecosys-tem associated with China Poot Bay. (Science-W79-02744

A CONCEPTUAL ECOLOGICAL MODEL FOR CHESAPEAKE BAY, K. A. Green

U.S. Fish and Wildlife Service, Biological Services Program. FWS/OBS-78/69. September, 1978. 22 p. 8 fig, 39 ref, 3 append.

Descriptors: *Model studies, *Chesapeake Bay, *Carbon cycle, *Cycling nutrients, Structural models, Wetlands, Wildlife, Vegetation, Waste disposal, Water quality.

posal, Water quality.

A conceptual model for the Chesapeake Bay ecosystem (wetlands, tributaries, and bay proper) was developed as an interrelated series of diagrams showing carbon and nutrient pathways. Information was based on an analysis of local literature and discussions with scientists who are studying the Bay. The ecological functions that produce the resources of commercial and recreational fisheries, habitat for migratory birds and other wildlife, waste disposal, and aesthetic water quality are indicated. Physical (light, turbidity, mixing, transport, sedimentation) and chemical (sediment-water interactions, presence of pollutants) aspects of the environment modify the rates of biological processes (primary, production, nutrient regeneration, larval survival). A detailed ecosystem model combining the wetlands, plankton, seagrasses, other benthos, and fish trophic dynamics submodels shows the importance of material transfer and interactions between subsystems. (Steiner-Mass) W79-02746

COASTAL WETLANDS: ROLE OF REMOTE SENSING,

Geological Survey, Reston, VA. For primary bibliographic entry see Field 7B. W79-02747

ENERGY FLUX IN A TIDAL CREEK DRAIN-ING AN IRREGULARLY FLOODED JUNCUS MARSH,

Mississippi State Univ., Mississippi State. Dept. of Zoology. C. T. Hackney. PhD Dissertation. May, 1977, 83 p.

Descriptors: *Tidal marshes, *Energy transfer, *Productivity, Wetlands, Salt marshes, Coastal marshes, Mississippi, Energy, Detritus.

marshes, Mississippi, Energy, Detritus.

The flux of suspended organic detritus, floating debris and animal biomass from a Mississippi tidal creek was studied during ten diurnal tidal periods (24 hour) and three semi-diurnal tidal periods (12 hour). There was a net export of floating debris (3.1 kg or 56,875 kj) and animals (0.49 kg or 9.721 kj), but a net import of suspended particulate detritus (38.5 kg or 209,540 kj) during the 13 tidal periods studied. The integration of these data is equal to an annual net import of six million kj or energy equivalent to less than 1% of the total productivity of the marsh. The energy equivalent of the floating detritus varied from 17.15 to 24.36 kj/gAFDW, while the energy equivalent of members of the marsh community varied from 20.32 to 30.49 kj/gAFDW. The concentration of suspended particulate organic detritus was predictable during ebb tide and was dependent primarily on tidal height, season, physical characteristics of the water (temperature, salinity, and dissolved oxygen) and the concentration of the fauna within the creek. The concentration of particulate organic detritus

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as not predictable during flood tide. (Steiner-W79-02748

APPLICATIONS OF REMOTELY SENSED DATA TO WETLAND STUDIES,

Geological Survey, Reston, VA.
For primary bibliographic entry see Field 7B. W79-02749

FACTORS AFFECTING TEMPERATURE AND SALINITY CONDITIONS ON A SCOTTISH SALT-MARSH, WITH NOTES ON THE ECOL-OF SPHAEROMA RUGICAUDA (LEACH).

Edinburgh Univ. (Scotland). Dept. of Zoology. D. J. Heath

Archiv fur Hydrobiologie, Vol. 75, No. 1, p 76-89, February, 1975. 3 fig, 3 tab, 18 ref.

Descriptors: *Salt marshes, *Salinity, *Water temperature, Wetlands, Estuaries, Marshes, Tidal marshes, Tides, Rainfall, Rivers, Mud, Ecological distribution, Salt tolerance, *Scotland.

Temperature and salinity determinations were made during spring tides over a period of 2.5 years on an estuarine salt-marsh in the Tyne estuary, East Lothian, Scotland. The range of temperature (2.5 to 22.5 degrees C) and the range of salinity (0.7 to 34.1 ppt) were greater than the ranges reported for other estuaries. Estuarine water temperature showed a greater report the salid timesterity. perature showed a greater range than did river perature showed a greater range than did river water, air, or sea water temperatures. Large expanses of mud in the estuary appear to influence the temperature of the estuarine water, raising it in the summer and lowering it in the winter. Salinity changed rapidly as the tide rose. Salinity at high water was negatively correlated to the flow of water in the river. Periods of heavy rainfall may result in low salinities. Findings are discussed in relation to the published works on the salinity and temperature tolerance of Sphaeroma rugicauda. (Stihler-Mass) W79-02754

GROWTH, ABUNDANCE AND DISTRIBU-TION OF LARVAL TABANIDS IN EXPERI-MENTALLY FERTILIZED PLOTS ON A MAS-SACHUSETTS SALT MARSH.

Marine Biological Lab., Woods Hole, MA. Boston Univ. Marine Program. R. A. Meany, I. Valiela, and J. M. Teal

Journal of Applied Ecology, Vol. 13, No. 2, p 323-332, August, 1976. 4 fig, 2 tab, 19 ref.

Descriptors: *Diptera, *Salt marshes, *Massachusetts, *Larvae, Insects, Fertilizers, Sludge, Ureas, Phosphorus, Effects, Life cycles, Foods, Growth rates, Ecological distribution, Wetlands, *Great Sippewissett Marsh(Mass).

Tabanus nigrovittatus and Chrysops fuliginosus, two of the four species of tabanid larvae found Great Sippewissett Marsh, comprised approximately 90% of the total tabanid population. They were both found predominantly in areas where the short form of Spartina alterniflora was the dominant plant. Larval tabanid populations were drastically reduced in plots treated with a sewage sludge fertilizer but were unaffected by treatments with a phosphate and a urea fertilizer. Larval densities were reduced in laboratory experiments from 80-240/ sq m to 40-120 sq through cannibalism. The lower figure approximates the densities found in the field. Summer growth rate is about 4 mm/month. (Stihler-Mass). W79-02755

SOILS OF THE INTER-TIDAL MARSHES OF DIXIE COUNTY, FLORIDA.

Florida Agricultural and Mechanical univ., Talla-hassee. Dept. of Soil Science.

For primary bibliographic entry see Field 2G. W79-02757

ECOSYSTEMS OF THE WORLD 1: WET COASTAL ECOSYSTEMS.
Elsevier Scientific Publishing Co., New York, 1977. 428 p. Edited by V. J. Chapman, University of Auckland, N. Z., Dept. of Botany.

Descriptors: *Wetlands, *Coastal marshes, *Mangrove swamps, *Geographical regions, *Distribution, Salt marshes, Temperate, Subtropical, Climates, Soils, Geomorphology.

Seventeen chapters by 18 authors review coastal wetlands, which comprise marine and brackish slat marshes of temperate regions and mangrove swamps in tropical and subtropical regions of the world. There is a preliminary consideration of the general nature of such wetlands followed by an account of the physiographic conditions under which they may and do develop. This is followed by a general account of the climatic conditions and soils associated with these wetlands, and the fauna to be found in them. Regional wetland sections are covered and the volume closes with an account of to be found in them. Regional wetland sections are covered and the volume closes with an account of the uses to which these wetlands have been and are currently put to and the changes such uses involve. (See W79-02763 thru W79-02779) (Steiner-Mass) W79-02762

INTRODUCTION; WET COASTAL ECOSYS-

TEMS, Auckland Univ. (New Zealand). Dept of Botany. V. J. Chapman. In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 1-29. 11 fig. 8 tab, 59 ref.

Descriptors: *Wetlands, *Coastal marshes, *Mangrove swamps, *Geographical regions, *Distribution patterns, Salt marshes, Distribution, Climates, Marsh plants, Temperature, Soil types, Silts.

The general distribution of mangrove swamps and salt marsh species/communities is broadly related to seven basic features of the maritime environto seven basic features of the maritime environ-ment air temperature, protected coastline, shallow shores, currents, slat water, tidal range, and sub-strate. The most extensive marshes and swamps are associated with regions where there is abundant silt brought down by rivers or where the geologi-cal nature of the land makes it subject to consider-able erosion that results in much silt suspension. able erosion that results in much silt suspension. Salt marsh formations are essentially characterized by low-growing flowering herbs, especially grasses. Arising from the relatively small number of species and communities found on the marshes, broad geographical areas can be noted in which there is substantial uniformity in the vegetation. In some cases, subdivision can be based on temperature or upon soil types. Nine major groups of maritime salt marshes are reconizable with 13 subgroups. Mangrove swamp formations are wholly aborescent; however, at the northern and southern limits, the trees become shrubby. Segretation by limits, the trees become shrubby. Segretation by temperature or soil types is not possible for the swamps—they are more closely related to past geographical spread. Six major groups of mangrove swamps with 11 subgroups are recognizable. (See also W79-02762) (Steinter-Mass) W79-02763

PHYSIOGRAPHY: WET COASTAL ECOSYS-

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 31-60. 17 fig, 4 tab, 44 ref.

Descriptors: *Salt marshes, *Mangrove swamps, *Geomorphology, Wetlands, Coastal marshes, Tides, Sedimentation, Marsh plants, Channel morphology. Distribution patterns

An account is given of salt marsh and mangrove swamp physiography, beginning with a discussion of salt marshes in England and Wales and then showing how marshes and mangrove areas in other geographical areas differ. In the early marsh stage, gowth is irregular, plants scattered, and sediments laid down by one tide may be removed by another. The tidal waters ebb and flow as a sheet and in

time build up the the margins of the flat and the slightly higher parts of it. These areas increase in elevation and vegetation and begin to expand laterally so that tidal ebb and flow become restricted into vaguely delimited channels. With increasing marsh growth these become more defined and eventually become a creek system which is characteristic of a salt marsh. The factors of marsh development that must be considered for each geographic area are the tides, the type, ad means of sedimentation, the floor on which the sediments rest, the slope of this floor and the irregularities on it, and the type and spread of vegetation. (See also W79-02762) (Steiner-Mass)

CLIMATE: WET COASTAL ECOSYSTEMS. Stuttgart Univ. (Germany F.R.). Botanisches Inst. For primary bibliographic entry see Field 2B. W79-02765

SOILS OF MARINE MARSHES,

Scripps Institution of Oceanography, La Jolla, CA. For primary bibliographic entry see Field 2G. W79-02766

SALT-MARSH ANIMALS: DISTRIBUTIONS RELATED TO TIDAL FLOODING, SALINITY AND VEGETATION,

Delaware Univ., Newark. Coll. of Marine Studies; and Delaware Univ., Newark. Dept. of Biological

For primary bibliographic entry see Field 2I.

THE COASTAL SALT MARSHES OF WEST-ERN AND NORTHERN EUROPE: AN ECO-LOGICAL AND PHYTOSOCIOLOGICAL AP-PROACH.

Delta Inst. for Hydrobiological Research, Yerseke (Netherlands). W. G. Beeftink.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 109-155. 14 fig, 10 tab, 222 ref.

Descriptors: *Coastal marshes, *Europe, Wetlands, Salt marshes, Distribution, Geographical regions, Distribution patterns, Ecological distribution.

An overall view is given of the biotic components of the West- and North-European salt marshes including the Atlantic coasts of the Iberian Peninsula. Attention is focused on the ecological features in pattern and process characteristic of salt marshes, and on their variability within this European coastal region. Remarks are given on the functional relationships within the European salt marsh ecosystem. The marshes are first considered to be bedge environment and their dominant disc. marsh ecosystem. The marshes are first considered as a border environment and their dominant diagnostics are briefly sketched. Among the organisms, phanerogams and their communities are first discussed, followed by remarks on algal and animal ecology. European salt marshes occupy a minor place in the total coast length. Generally the marshes show a disjunct distribution of limited areas, but on certain coasts they occupy vast parts of the shore. The marshes are found primarily in and around river mouths, but also in bays, Wadden areas, lagoons, and on beach plains protected by sand or shingle spits. (See als W79-02762) (Steiner-Mass) W79-02768

MANGALS AND SALT MARSHES OF EAST-ERN UNITED STATES,

Georgia Univ., Brunswick. Marine Resource Exn Center.

R. J. Reimold.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 157-166. 1 fig, 4 tab, 74 ref.

Descriptors: *Distribution, *Coastal marshes, *Atlantic Coastal Plain, Wetlands, Salt marshes, Geographical regions, Distribution patterns, Productiv-

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ity, Marsh plants, Classification, Georgia, South

Along the Atlantic coast of the United States there are some 890,308 ha of wetlands which include 589,480 ha of salt marshes. The distribution by state reveals that the greatest expanses occur along the central and southern reaches of the east coast. South Carolina and Georgia alone contain over 62% of all east coast salt marshes. The marshes have faunal and floral components common over this entire region. Spartina alterniflora, which dominates the intertidal zone, is the characteristic vegetation from eastern Canada to south Florida. It has the greatest productivity in Georgia, 2000-3000 g/ag m/year, and there appears to be a latitudinal variation in primary production. Since it is energy that originates in these primary producers that actually nourishes higher trophic levels in the salt marsh, future quantitative comparisons of salt marshes might best be based on production measurements using standardized techniques. The marshes of eastern North America may be classified as Spartina-Juncus marshes for world-comparative purposes. (See also W79-02762) (Steiner-Mass)
W79-02769 W79-02769

PLANT AND ANIMAL COMMUNITIES OF PACIFIC NORTH AMERICAN SALT MARSHES.

California Univ., Santa Barbara. Dept. of Geologi-

K. B. MacDonald.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 167-191. 8 fig, 2 tab, 151 ref.

Descriptors: *Salt marshes, *Distribution patterns, *Halophytes, *Aquatic animals, *Pacific Coast Region, Wetlands, Marshes, Distribution, Coastal marshes, Marsh plants, Classification, Wildlife, habitat, Wildlife, Salinity.

Both the general organization and the faunal composition of middle latitude Pacific salt marsh communities are closely similar to those described in other parts of the world. Shared genera are common and several examples of identical species can be cited. Only a few of the species appear to be restricted to this habitat. Instead, many marine macroinvertebrates represent estuarine genera commonly recorded for subtidal muds, rocky shores, or exposed open beaches. These species rarely penetrate the high marsh. Conversely, terrestrial species common in the high marsh rarely occur in the more frequently submerged low marsh. Among the more mobile salt marsh species, terrestrial forms appear to be both more numerous and diverse than mobile marine macroinvertebrates and fish. Amother taxa characteristic is the low species-diversity-high density population pattern widely regarded as typical of extreme, highly fluctuating physical environments. The vegetation of most of these marshes is dominated by a rather small number of halophytes often less than 10 and only rarely as many as 20 species per site. As salinities decline, as local freshwater sources appear, or as human disturbance increases, maritime, upland, or weedy species appear and the diversity of the marsh flora rapidly increases. (See also W79-02762) (Steiner-Mass) W79-02770

TIDAL SALT-MARSH AND MANGAL FORMA-TIONS OF MIDDLE AND SOUTH AMERICA,

Louisiana State Univ., Baton Rouge.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 193-213. 16 fig, 1 tab, 92 ref.

Descriptors: *Salt marshes, Mangrove swamps, *Atlantic Coastal Plain, *Pacific Coastal Plain, Gulf Coastal Plain, *Distribution patterns, Wetlands, Tidal marshes, Coastal marshes, Marshes, Swamps, Distribution, Halophytes, Marsh plants, Ecological distribution, Gulf of Mexico, Louisiana, Sites.

Along the northern coast of the Gulf of Mexico, salt marshes are best developed on the fringes of the inactive Mississippi River delta and the coastal plain of Louisiana. More than three-fourths of the total aslt marsh acreage along the Gulf Coast, and half of the total U.S. acreage, occurs there. In floristic composition and succession, they are closely related to those of the Atlantic coast with Spartina, Juncus, and Distichlis as dominants. The dominance of cliffed coasts, extensive sand beaches, and dume fields have limited tidal marshes along the Atlantic from southern Brazil to Tierra del Fuego to relatively small deltaic plains and river mouths. On the pacific side, marshes are confined to small disjunct inlets along the southern and central coast of Chile. South American species of Spartina, Distichlis, Juncus, and Salicornia dominate north of approximately 44 degrees S. South thereof, low salt tolerant shrubs become dominant as Spartina and other salt grasses rapidly decline in abundance. Tropical salt marsh formations are usually limited in extent because of competition with mangrove species. On the Atlantic, mangroves extend from the tip of Florida to southern Brazil. On the Pacific, they range from northern Brazil. On the Pacific, they range from northewestern Mexico to the Peruvian-Ecuadorian border. (See also W79-02762) (Steiner-Mass)

AFRICA A. WET FORMATIONS OF THE AF-RICAN RED SEA COAST, Mansoura Univ. (Egypt). Dept. of Botany.

M. A. Zanran.
In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p 215-231. 6 fig, 1 tab, 49 ref.

Descriptors: *Salt marshes, *Mangrove swamps, *Red Sea, *Distribution patterns, *Sites, Wetlands, Coastal marshes, Marshes, Swamps, Halophytes, Marsh plants, Ecological distribution, Cattails, Classification.

Classification.

The wet formations of the African Red Sea coast are comprised of mangrove swamps, reed swamps, and salt marshes. The mangrove vegetation, dominated by Avicennia marina, is well developed along the entire coast. The reed swamp vegetation, dominated by Phragmites australis and Typha domingensis, is distributed along the entire coast in limited patches where the soil is relatively less saline and the water not too shallow. The initial salt marsh vegetation comprises 23 principal community types. These may be ecologically classified into two main groups: communities of the saline flats and communities of the piled sand. the communities, even those which are ecologically and morphologically similar, are scattered in their geographical distribution. Vegetative zonation is complete only where the shore rises gently and gradually into the land, and this occurs rarely. The topography of the salt marsh comprises different types of shoreline bars, and its ground may be studded by mounds and hummocks of various dimensions. (See also W79-02762) (Steiner-Mass) W79-02772

AFRICA B. THE REMAINDER OF AFRICA: WET COASTAL ECOSYSTEMS,

Auckland Univ. (New Zealand). Dept. of Botany. V. J. Chapman.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p 233-240. 6 fig, 1 tab, 27 ref.

Descriptors: "Salt marshes, "Mangrove swamps, "Distribution patterns, "Sites, "African, Wetlands, Coastal marshes, Marshes, Swamps, Marsh plants, Halophytes, Ecological distribution.

The locations and major vegetative dominants are given of the salt marshes and mangrove swamps of the African coast. Along the North African coast Juncus acutus salt marsh communities frequently occur where there is high water moisture, salt and good drainage. Less saline areas on the landward side are occupied by Tamarix africana. Mangrove samps predominate along West Africa with only a few isolated patches of salt marsh. Mangroves predominate along the East African coast, especial-

ly in the estuaries and along the offshore coral reefs. Temperatures along the South African coast are too cool for mangroves and the wet coastal formations are salt marshes. (See also W79-02762) (Steiner-Mass) W79-02773

OUTLINES OF ECOLOGY, BOTANY AND FORESTRY OF THE MANGALS OF THE

FORESTRY OF THE MANGALS OF THE INDIAN SUBCONTINENT, Centre National de la Recherche Scientifique, Toulouse (France). Inst. de la Carte Internationale du Tapis Vegetal.

F. Blasco.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p 241-260. 4 fig. 2 tab, 70 ref.

Descriptors: *Mangrove swamps, *Distribution patterns, Wetlands, Ecological distribution, Sites, Deltas, Halophytes, Vegetation regrowth, Marsh

In the Indian territory, the mangrove swamps cover over 350,000 ha. Of this wooded area 85% lies in the Gangetic Delta and in the islands of the Bay of Bengal. In the other deltas, the mangroves, affected by an overhigh population density and excessive grazing, are highly degraded and are not of economic importance unless scientific forest or economic importance unless scientific forest management and pisiculture are undertaken. Prac-tically every delta has a forest with distinct eco-logical and botanical traits. The total halophytic flora is rich; 58 major species have been enumer-ated. At present the more common species of the Indian mangroves are an aborescent member of the Euphorbiaceae, Excoecaria agallocha, and diverse species of Avicennia. These species have a great ecological amplitude and faculty for vegetative regeneration. The Rhizophora species, which show a poor resistance against strong biotic pressures, have become rare and have disappeared or tend to disappear, except in the Cauvery Delta and the Audaman Islands. (See also W79-02762) (Steiner-W79-02774

WET COASTAL FORMATIONS OF INDO-MA-LESIA AND PAPUA-NEW GUINEA,

Auckland Univ. (New Zealand), Dept. of Botany. V. J. Chapman.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p 261-270. 7 fig, 36 ref.

Descriptors: *Mangrove swamps, *Distribution patterns, Wetlands, Estuaries, Herbicides, 2,4-D, Ecological distribution, Sites, Crabs.

In Malaya the most extensive mangrove swamp forests are found in the Riau Islands south of Singapore, on the eastern shore of Sumatra, the southern and western shores of Borneo, and the southern coast of New Guinea. A number of rivers in the region are substantial with their lower reaches flowing over an extensive lowland. Tidal influence and mangroves can therefore extend up to 130-320 km inland. The community distribution in Indo-Malesia depends largely on physiography, salinity, soil type, degree of exposure, and drainage with frequency of inundation, age of swamp, and light as less significant. On the Vietnamese coast, extensive mangrove swamps are found and are light as less signficant. On the Vietnamese coast, extensive mangrove swamps are found and are estimated to occupy 2800 sq km. The fauna is dominated by crabs present in large numbers which affect mangrove regeneration. With increase in latitude, mangrove species gradually disappear until only Kandelia candel remains in southern Japan. The various mangrove species in Vietnam have all proven susceptible to defoliation by a mixture of 2,4-D and Picloran. The sprayed may remain uncolonized for up to six years. Possible causes in delayed regeneration are: crab predators of seedlings, compaction of the soil after death of trees, or actual lack of seeding colonizers. (See also W79-02762) (Steiner-Mass) W79-02775

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MANGALS OF MICRONESIA, TAIWAN, JAPAN, THE PHILIPPINES AND OCEANIA, Kyushu Univ., Fukuoka (Japan).
T. Hosokawa, H. Tagawa, and V. J. Chapman.
In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p 271-291. 12 fig, 10 tab, 70 ref.

Descriptors: *Mangrove swamps, *Distribution patterns, Wetlands, Estuaries, Ecological distribution, Sites, Coasts, Islands.

Mangrove swamps in Micronesia are not as extensive or well developed as those in the subtropical region further west. Considerable areas around all the high coastline, with large swamps in estuaries and filled lagoons. In Oceania, the development of and filled lagoons. In Oceania, the development of mangroves is strictly influenced by the direction of the prevailing wind, the widest belts occur on the leeward coast and the narrowest on the windward coast of the island. Mangrove vegetation in Taiwan has generally developed in localities of quite seasonally dry climate, mainly in three sites along the northern and southwestern parts of the coast. The islands of Nansei-shoto of southwest Japan form stepping stones for mangroves from Japan form stepping stones for mangroves from tropic Asia to the warm temperate region of Kyushu in Japan. The areas occupied by the mangrove forests and the diversity of species composition decrease with increasing latitude. At the northern limit and in adjacent areas, mangrove is represented by a stand of one species Kandelia candel. The mangrove ecosystems in Polynesia are essentially similar in their composition, but do not achieve extensive status. (See also W79-02762)(Steiner-Mass)

MANGAL AND COASTAL S
COMMUNITIES IN AUSTRALIA. SALT-MARSH

Queensland Univ., Brisbane (Australia). Dept. of Botany.

P. Saenger, M. M. Specht, R. L. Specht, and V. J.

Chapman.
In: Ecosystems of the World 1: Wet Coastal Eco systems, Elsevier Scientific Publishing Co., New York, 1977, p. 293-345. 16 fig, 14 tab, 256 ref.

Descriptors: *Mangrove swamps, *Distribution patterns, *Salt marshes, Wetlands, Estuaries, Ecological distribution, Sites, Tidal marshes, Coastal marshes, Marshes, Marsh plants, Halophytes.

Mangorve vegetation is found around the coasts of all mainland states of Australia. In both species all maniana states of Australia. In both species diversity and extent, the mangrove complex shows greatest development in northern tropical Australia where there are 27 tree species. Progressively fewer species, occupying smaller and smaller areas of the landscape, are found in the subtropical region, while only one specie, Avicennia marina, extends into the temperature region. Mangrove vegetation in New Guinea shows an even richer flora with the forests often reaching 30m or more in height. The large concentration of mangrove species and associated plants in the northwestern area of Australia can be attributed to three factors this region was the origin of dispersal, the climatic region approximates that under which the man-grove vegetation first developed, and numerous estuaries provide large areas suitable for growth.
Tidal salt marsh vegetation in contrast to mangrove vegetation, becomes increasingly more complex in structure and contain more species as lati-tude increases from tropical to temperate. Most dominant Australian salt marsh species have a wide geographical range, while a number, usually understory species, are confined to the temperature region. (See also W79-02762) (Steiner-Mass) W79-02777

EXPLOITATION OF MANGAL,

nental Research Lab., Gulf Breeze, FL.

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 347-362. 9 tab, 178 ref.

Descriptors: *Mangrove swamps, *Fish farming, *Economics, Land use, Wetlands, Estuaries, Pro-

ductivity, Natural resources, Timber, Pulp and paper industry, Georgia, Publications, Forest man-

A literature review is made of the economic and ecological values with man's uses of mangrove productive estuarine ecosystems, fixing as much energy as other estuarine systems, eutrophic ponds, evergreen forests, or good farmland. The stands serve as nurseries and food sources for many game and food fish. An acre, 0.405 ha, of undisturbed estuary yields an estimated \$7,980 worth of commercial fish products in 20 years. The value of the Alcony River Swamp in Georgia, 930 ha in area, exceeds over seven million dollars a year in fisheries resources. For every acre of estuary filled or dredged, two additional acres are lost to fish production, yielding a total capitalized loss of \$23,940 during 20 years. The mangrove forest is of considerable importance, not only as a source of firewood, charcoal, timber, and swamps. Mangrove forests are among the most productive estuarine ecosystems, fixing as much during 20 years. The mangrove forest is of considerable importance, not only as a source of firewood, charcoal, timber, and tannin, but also as a shoreline stabilizer. A recent development in mangrove utilization has been production of high-alpha pulps for the manufacturing of rayon, cellophane, lacquers, cellulose acetate, and other cellulose derivatives. (See also W79-02762) (Steiner-Mass) W79-02778

HUMAN USES OF SALT MARSHES.

Maryland Univ., College Park. Chesapeake Re-

W. H. Queen

In: Ecosystems of the World 1: Wet Coastal Ecosystems, Elsevier Scientific Publishing Co., New York, 1977, p. 363-368. 29 ref.

Descriptors: *Salt marshes, *Economics, *Marsh management, Wetlands, Coastal marshes, Fish management, Productivity, Shellfish, Commercial fisheries, Wildlife habitat, Waste water treatment, Estuaries, Marsh plants, Erosion control.

Present calculations of marsh value emphasize nat-ural characteristics and processes revealed by ecological studies over the past several decades. These characteristics and processes many be grouped into four categories: biological production, aquaculture, waste-water assimilation, and other uses. Biologically, estuaries bordered by marshes, and coastal waters in the vicinity of extensive marsh-estuarine systems, are among the world's most productive waters in terms of both commercial and sport fisheries. Both estuarine shellfish and many coastal water finfish are doubly dependent on coastal salt marshes. Of equal importance with the habitat role is the function of marshes as producers of nutrient material, especially organic material. Economic demand has stimulated interest in increasing fish and shellfish production in estuarine waters by the use of aquaculture techniques. Althouh these techniques represent commercial exploitation of marshes, they are dependent upon the production marshes, they are dependent upon the production of organic nutrients by marsh plants, a natural marsh process. Waste water assimilation by marsh plants has led to considerable speculation that marshes can be used to partially purify domestic waste water thereby reducing the need for tertiary sewage treatment. Other marsh characteristics useful to man are erosion control, prevention of damage resulting from tidal flooding, and the cycling of nitrogen and sulphur. (See also W79-02762) (Steiner-Mass) W79-02779

ENVIRONMENTAL STUDIES OF KACHEMAK BAY AND LOWER COOK INLET, VOLUME VI; FOOD HABITS OF SHRIMP IN KACHE-MAK BAY, ALASKA, Ruigers - The State Univ., NJ. Dept. of Botany.

Alaska Department of Fish and Game, Marine/ Coastal Habitat Management, 33 p, 1977. 2 fig, 10

Descriptors: *Shrimp, *Alaska, *Food habits, Organic matter, Wetlands, Marshes, Diatoms, Algae, Crustacean, *Kachemak Bay(Alas), *Lower Cook Inlet(Alas).

Examination of the stomach contents of Pink, Coonstripe, and Sidestripe shrimp revealed that amorphous organic matter (detritus) and algae, mostly diatoms and fragments of macroalgae were the principal food sources. The stomachs also contained substantial amounts of invertebrate parts and grit; the former was mostly lacking protoplasm and probably of secondary importance as an energy source. The shrimp are apparently ingesting matter at or near the bottom since plankton samples taken concurrently did not correspond with stomach contents. Most of the diatoms and some of the macroalgae found in the stomachs are associated with the marsh-mudflat areas that are well represented in Kachemak Bay. (Steiner-Mass)

DENITRIFICATION IN A MASSACHUSETTS SALT MARSH,
Boston Univ., MA. Dept. of Biology.
For primary bibliographic entry see Field 5A. W79-02812

THE ECOLOGY OF PALAEMONETES PUGIO IN A SOUTHEASTERN SALT MARSH ECO-SYSTEM WITH PARTICULAR EMPHASIS ON PRODUCTION AND TROPHIC RELATION-

South Carolina Univ., Columbia. School of Marine

PhD Dissertation, 1977, 121 p.

Descriptors: *Salt marshes, *Shrimp, *Animal populations, Wetlands, Tidal marshes, Coastal marshes, Aquatic animals, Crustaceans, Growth rates, Aquatic habitats, Southeast U.S.

Grass shrimp, Palaemonetes pugio, populations of three salt marsh tidal creeks were sampled qualita-tively and quantitatively and a population model tively and quantitatively and a population model was constructed to quantify the population dynamics over an annula cycle. Size-cohort analysis of the multivoltine, epibenthic adult population was undertaken to assess the growth, recruitment, and mortality and incorporate these data in the production model. Peak abundance was found to occur in late fall and the lowest numbers in late spring. Two spawning periods per year were found with the individual life span being less than one year. Growth rates over time and size classes were quite constant. Total annula egg production was 9.2% of the total annual production of females. Production of males, females and eggs was estimated by monthly intervals over an annual cycle. The subadult and adult stages of the shrimp were found to utilize an intertidal habitat. The tidal migrations of the shrimp were measured. By combining tidal data with shrimp migration data, an estimated of habitat utilization was obtained which indicated thabitat utilization was obtained which indicated the shrimp spend most of the time within the intertidal creek bank area. (Steiner-Mass) W79-02821

PH FLUCTUATION IN AN INTERTIDAL BEACH IN BERMUDA.

Innsbruck Univ. (Austria). Inst. fuer Zoophysiolo-

E. Gnaiger, G. Gluth, and W. Wiesser Limnology and Oceanography, Vol. 23, No. 5, p 851-857, September 1978. 5 fig. 1 tab, 55 ref.

Descriptors: *Alkaline water, *Hydrogen ion con-Descriptors: Alkaline water, "Hydrogen for contration," Beaches, On-site investigations, On-site data collections, Laboratory tests, Shores, Alkalimity, Sediments, Water chemistry, Light, Temperature, Water temperature, Correlation analysis, Data processing, Fluctuations, "Bermuda.

Unusually high pH values up to 9.6 measured during low tide in a calcareous sandy beach were correlated with high in situ temperatures. Daily flucutations of up to 1.5 pH units are limited to the topmost layer of sediment. Light, by controlling photosynthesis, is the causal factor in determining high pH at the surface; subsurface sediments do not respond to experimental light changes. Indica-tions of such fluctuations are lacking in the literaA R TER TUA WAT Prog

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ture. These fluctuations could influence community respiration. (Sims-ISWS) W79-02842

A RAPID AND PRECISE METHOD FOR DE-TERMINING SULFATE IN SEAWATER, ES-TUARINE WATERS, AND SEDIMENT PORE

TUARINE WATERS, AND SEDIMENT PORE WATER,
Woods Hole Oceanographic Institution, MA. Joint Program in Biological Oceanography.
For primary bibliographic entry see Field 2K.
W79-02846

MICROFLUOROMETRIC METHOD TO MEASURE AMMONIUM IN NATURAL MEASURE AMMONIUM IN NATURAL WATERS, Skidaway Inst. of Oceanography, Savannah, GA. For primary bibliographic entry see Field 2K. W79-02287.

SOLAR MIDDLE ULTRAVIOLET (UV-B) MEASUREMENT IN COASTAL WATERS RICH IN YELLOW SUBSTANCE, Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.

N. K. Hojerslev.
Limnology and Oceanography, Vol. 23, No. 5, p. 1076-1079, September 1978. 5 fig, 1 tab, 9 ref.

Descriptors: *Irradiation, *Oceans, *Ultraviolet radiation, *Instrumentation, Equipment, Radiation, Measurement, Transmissivity, Coasts, On-site investigations, Oceanography, Downwelling irradi-

The properties of a Danish UV-B meter and a Robertson UV-B meter, designed for underwater use, were discussed. Measurements of the radiant energy in the UV-B region in waters rich in yellow substance were performed appropriately by means of the Danish UV-B meter only. (Sims-ISWS) W79-02849

FINE STRUCTURE INSTABILITIES INDUCED BY DOUBLE DIFFUSION IN THE SHELF/

SLOPE WATER FRONT, City Univ. of New York. Inst. of Marine and Atmospheric Sciences.

Attuospiteric Sciences. E. S. Posmentier, and R. W. Houghton. Journal of Geophysical Research, Vol. 83, No. C10, p 5135-5138, October 20, 1978. 6 fig, 7 ref. ERDA EY76-S-02-2186.

Descriptors: *Stability, *Sea water, *Continental shelf, *Diffusion, *Atlantic Ocean, Salinity, Temperature, Water temperature, Density, Continental slope, Mixing, Salts, On-site investigations, On-site data collections, Data processing, Analytical techniques, Oceans, Oceanography, *New York bight.

Intervals of negative stability were observed which appear as part of distinct loops in the T-S diagram of CTD hydrographic stations near the shelf break in the New York Bight. These features occur within the shelf break frontal zone, which is associated with active interleaving between warm, salty slope water and cooler, fresher shelf water. Double-diffusive mixing was proposed as the mechanism responsible for the observed T-S correlations. (Sims-ISWS)

POOLS OF NITROGEN IN A GEORGIA SALT MARSH,

Georgia Univ., Athens.
For primary bibliographic entry see Field 5C.
W79-02899

DETRITUS AS FOOD FOR ESTUARINE COPE-

Maryland Univ., Solomons. Chesapeake Biological D. R. Henie, R. P. Harris, J. F. Ustach, and D. A. Flemer. Marine Biology, Vol. 40, p 341-353, 1977. 1 fig, 10 Descriptors: Marshes, *Detritus, *Copepods, Marsh production, Estuaries, Nutrients, Estuarine animals, *Marsh plants, Food chains, Carbon bal-

A variety of detrital foods derived from marsh plants were fed to the copepods Eurytemora affinis and Scottolana canadensis. The copepods did not survive well or produce eggs when feeding on detritus with smaller amounts of microbiota, but did well when a rich and abundant microbiota was present. Cliated protozoans appear to be particularly important in the transfer of detrital energy to copepods.

W79-02916

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK BIGHT, FIRST AND SECOND MONITORING CRUISES, NOVEMBER 1975 AND MARCH

National Oceanic and Atmospheric Administra-tion, Boulder, CO. Marine Ecosystems Analysis Program Office.

For primary bibliographic entry see Field 5C. W79-02922

MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS, Fish and Wildlife Service, Washington, DC. For primary bibliographic entry see Field 5G. W79-02931

SALT MARSH PLANT GERATOLOGY, Georgia Univ., Brunswick. Marine Extension Service. For primary bibliographic entry see Field 2I. W79-02932

THE SEED BANKS OF PRAIRIE GLACIAL MARSHES,

Iowa State Univ., Ames. Dept. of Botany and Plant Pathology. For primary bibliographic entry see Field 2I. W79-02933

PLANT STANDING CROP AND PRODUCTIV-ITY RELATIONS IN A SCIRPUS-EQUISTUM WETLAND,

McGill Univ., Montreal (Quebec). Dept. of Biol-For primary bibliographic entry see Field 2I. W79-02936

CONTRIBUTION OF CHRONIC PETROLEUM INPUTS TO NARRAGANSETT BAY AND RHODE ISLAND SOUND SEDIMENTS, Rhode Island Univ., Kingston, Graduate School of

Oceanography.
For primary bibliographic entry see Field 5B. W79-02942

STUDIES OF THE INVERTEBRATE FAUNA OF A WET SLACK IN A SAND DUNE SYSTEM, A. M. Bevercombe, N. Cox, M. P. Thomas, and J. O. Young. Archiv Hydrobiologie, Vol. 71, No. 4, p 487-516, 1973. 6 fig, 5 tab, 50 ref.

Descriptors: *Wetlands, *Zooplankton, *Benthic fauna, Dunes, Invertebrates, Aquatic animals, Drought tolerance.

Geographical, physical, and chemical data from Massam's Slack--a wet dune slack subject to periodic drying out-are given and the seasonal abundance and distribution of the zooplankton and zoobenthos is described. The species of zooplankton occurring in the slack are typical of shallow waters containing abundant vegetation. Most of the species present, however, have minor differences in life history depending on whether they occur in the slack pool or skirting drainage ditch. The zoo-benthos is divided into three groups: animals which survive and multiply while conditions are

favorable but perish when drought occurs; animals which leave the slack when conditions become dry; and animals capable of surviving a period of drought. (Steiner-Mass) W79-02948

FACTORS CONTROLLING THE AVAILABIL-ITY OF SEDIMENT-BOUND LEAD TO THE ESTUARINE BIVALVE SCROBICULARIA PLANA,

Geological Survey, Menlo Park, CA. For primary bibliographic entry see Field 5C. W79-02961

SEASONAL PHYTOPLANKTON PRODUC-TION IN THE WESTERN ENGLISH CHAN-NEL 1964-1974, Marine Biological Association of the United King-dom, Plymouth (England). Plymouth Lab. For primary bibliographic entry see Field 5C. W79-02963

AN EXPOSURE SCALE FOR MARINE SHORES IN WESTERN NORWAY, Imperial Coll. of Science and Technology, London (England). Dept. of Botany. For primary bibliographic entry see Field 5B. W79-02964

NUTRIENT REGENERATION BY ZOOPLANK-TON DURING A RED TIDE OFF PERU, WITH NOTES ON BIOMASS AND SPECIES COMPO-STITION OF ZOOPLANKTON, Dalhousie Univ., Halifax (Nova Scotia). Dept. of

Oceanography.

For primary bibliographic entry see Field 5C.

W79-02975

HYDRODYNAMIC TRANSPORT PHENOM-ENA IN ESTUARIES AND COASTAL WATERS. SCOPE OF MATHEMATICAL MODELS, Waterloopkundig Lab., Delft (Netherlands) and Rijkswaterstaat, Rijswijk (Netherlands). Data Processing Div.

C. B. Vreugdenhil, and J. Voogt.

Presented at ASCE Symposium on Modeling 75, held in San Francisco, CA, on 3-5 September, 1975. Publication no. 155, December 1975. 1 fig, 26

Descriptors: *Estuaries, *Coasts, *Hydrodynamics, *Turbulent flow, *Water quality, Mathematical models, Water transport.

An analysis is given of the assumptions in different types of mathematical models for the transport of water and other quantities in estuaries and coastal waters. The starting point is formed by the equa-tions for three-dimensional turbulent flow. An esti-mate of the importance of various terms is given. By several averaging processes, increasingly sim-pler models are obtained, but the interpretation of coefficients becomes increasingly more difficult. Also the numerical possibilities are discussed, with Also the numerical possibilities are discussed, with special emphasis on aspects of accuracy and non-linear stability which are considered the most important numerical problems. Attention is limited to nearly horizontal flow, although the influence of short waves on these flows is also treated. In the discussion the parallel between momentum and mass transfer (hydrodynamics and water quality) is taken into account. (Sinha - OEIS) W79-02983

CORRELATIONS OF FISH CATCH AND ENVI-RONMENTAL FACTORS IN THE GULF OF MAINE,

Bedford Inst. of Oceanography, Darthmouth(Nova Scotia). Marine Ecology Lab. W. H. Sutcliffe, Jr., K. Drinkwater, and B. S.

Journal of the Fisheries Research Board of Canada, Vol. 34, p. 19-30, 1977. 62 ref.

Descriptors: *Commercial fish, *Commercial shell-fish, *Water temperatures, *Fluctuations, Fish

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management, Correlation analysis, *Environmental effects, *Marine fisheries, Maine, Air temperature, Atlantic Ocean, Fishing effort, St. Lawrence River discharge, Catch prediction, Marine environment, *Gulf of Maine.

In an investigation of catches of 17 commercial marine species of fish and shellfish from the Gulf of Maine, 10 showed statistically significant correlations with sea temperatures at St. Andrews, N.B., or Boothbay Harbour, Maine. Most fish records contained at least 40 yr. of data. Descriptive equations are produced for four species based first on the correlation between catch and sea temperature and second on the correlation between catch and sea temperature allowing for fishing effort. Inclusion of fishing effort, improved the correlations for all of the species examined. The equations permitted the 'prediction' of later parts of the records from earlier parts. Considering the fish species collectively, the Gulf of Maine system from 1940 to 1959 appeared to be in equilibrium with litte fluctuation in the total commercial biomass. The large fluctuations in individual species abundance are interpreted as resulting from a combination of are interpreted as resulting from a combination of are interpreted as resulting from a combination of fishing pressure and to a significant degree oceanic climate as represented by sea temperature. The small fluctuations in the total biomass displays the species variation, with their differing climatic 'preferences,' as well as possible predator (including man)-prey relationships. Environmentally imposed patterns underlie at least 50% of the fluctuations in catch of many species and the understandations in catch of many species and the understand-ing of these fluctuations is basic to effective man-agement. (Katz) W79-02997

THE PRESENCE OF POLLUTANT HYDRO-THE PRESENCE OF POLLUTANT HYI CARBONS IN ESTUARINE EPIPI DIATOM POPULATIONS, Bristol Univ. (England). School of Chemistry. For primary bibliographic entry see Field 5C. W79-02998

HIGH-MAGNESIUM CALCITE OOIDS FROM THE GREAT BARRIER REFE Bureau of Mineral Resources, Geology and Geo-

physics, Canberra (Australia). J. F. Marshall, and P. J. Davies. Journal of Sedimentary Petrology, Vol. 45, No. 1, March 1975, p 285-291, 5 fig, 13 ref.

Descriptors: *Petrology, *Sedimentary petrology, Sediments, Petrofabrics, Magnesium compounds, Magnesium, Calcite, *Australia, X-ray analysis, *Ooids, *Great Barrier Reef.

Ooids are repoted from the Great Barrier Reef as occurring over an area of 340 sq km as unconsoli-dated sediments in water depths of 100-120 m. there is no direct evidence on the age of the ooids but some circumstantial evidence points to an early Holocene age. X-ray diffraction analysis and electron probe studies indicate that they are composed of high-magnesium calcite. The ooids show well defined concentric, radial, and granular fabrics with all three fabric types occurring in the cortex developed around polycrystalline nuclei. Two possible alternatives for the origin of the ooids are suggested: either they were precipated originally as aragonite and have been subsequently replaced as aragonic and have been subsequently replaced by high-Mg calcite, or they were precipated origi-nally as high-Mg calcite. Evidence for the two hypotheses is discussed. (Chilton-ORNL) W79-02999

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DEVELOPMENT OF A 50,000 GPD SEAWATER REVERSE OSMOSIS PILOT PLANT BASED ON CELLULOSE TRIACETATE HOLLOW FINE FIBERS

Dow Chemical U. S. A., Walnut, CA. Western

Div. Research Labs. R. D. Ammons.

R. D. Ammons.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 158, Price codes: A12 in paper copy, A01 in microfiche. Final Report, OWRT/S--78/9, September 1978. 270 p, 33 fig, 20 tab, 5 append. OWRT/S--78/9(No. 3188)(1).

Descriptors: Sea water, *Desalination, *Membrane processes, *Reverse osmosis, Membranes, Filtration, Cellulose triacetate hollow fibers, Pilot plants, Economics, Wrightsville Beach Test Facility(NC), Pretreatment studies, Diatomaceous earth filtra-

The objectives were to develop a commercially attractive seawater desalting module based on cel-lulose triacetate hollow fine fibers, determine the lulose triacetate hollow fine fibers, determine the level of pretreatment necessary to maintain good module performance, and demonstrate the economics and feasibility of reverse osmosis for seawater desalinatin by constructing and operating a 50,000 GPD pilot plant at the Wrightsville Beach Test Facility. Development and testing of eight inch (2500 GPD) modules was highly successful, and the product water cost (\$3.40-\$4.00 per 1000 and \$4.00 and the product water cost (\$3.40-34.00 per 1000 gal. based on three-year membrane life) was low enough to assure that reverse osmosis will gain acceptance in seawater desalting. An expanded pretreatment study became necessary and resulted in development of diatomaceous earth filtration as an economically competitive and technically superior alternative to sand filtration for pretreating feedwater. Development of a larger reverse osmo-sis module was not commercially successful but the ground work was laid for future work. W79-02676

DESALINATION TECHNOLOGY TRANSFER CENTER

Fairleigh Dickinson Univ., Teaneck, NJ. Coll. of Science and Engineering. D Bakish

R. Bakish.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 478, Price codes: A02 in paper copy, A01 in microfiche. Final Report, August 31, 1978. 11 p, 1 larg. diag. OWRT T-0018(No. 7704)(1).

Descriptors: Desalination, *Technology transfer, Desalination apparatus, *Virgin Islands, *Desalination plants, Information exchange, Waste water

A Desalination Technology Transfer Center was established at the West Indies Laboratory of Fairleigh Dickinson University. Surplus equipment from OWRT's facilities in Wilmington, N. C. was moved to St. Croix and installed in specially constructed 30-by 60-ft partially roofed concrete pad. Water intake to feed the system was installed as was a new power supply line to serve the system. In addition, complete pretreatment train was placed in service suitable for use in demonstration, research and development. The system has the capability of feeding up to four 1500 gpd RO modules. At time of completion of the contract the system was capable of feeding the RO modules with water with silting density index lower than 3. W79-02840

3B. Water Yield Improvement

WEATHER MODIFICATION ACTIVITIES IN TEXAS, 1974-77.

Texas Dept. of Water Resources, Austin. Weather Modification and Technology Section.
Report 219, August 1978. 85 p, 35 fig, 27 tab.

Descriptors: *Weather modification, *Cloud seeding, *Projects, *Texas, Precipitation(Atmospheric), Rainfall, Rain, Hail, Silver iodide, Aircraft, Contracts, Administration, Legal aspects, Permits, Weather, Cloud physics, Meteorology, Water re-

The State of Texas joined a number of other states which enacted weather modification legislation

during the 1960's with enactment in 1967 of the present Texas Weather Modification Act. Under provisions of this Act, the Texas Water Development Board was charged with the administration of the Act. Effective September 1, 1977, Texas' three water resources agencies, the Texas Water Rights Commission, the Texas Water Development Board, and the Texas Water Quality Board, were consolidated to form the Texas Department of Water Resources. The authority for regulating were consolidated to form the Texas Department of Water Resources. The authority for regulating weather modification activities in Texas was transferred to the new Department on that date. An outstanding feature of the authority given the Department by the Act relates to a weather modification license and permit system. The Act requires that potential weather modifiers first obtain a license and a permit before beginning a project. This report described those activities which were conducted during the period 1974-77 under licenses and permits. No attempt was made in this report to analyze the degree of success or failure of these activities. The errest variability of natural weather analyze the degree of success of failure of these activities. The great variability of natural weather phenomena in Texas makes results extremely difficult to ascertain. A number of years is usually required before the results of a particular program can be determined. (Sims-ISWS)

W79-02699

WATER CONSERVATION INFORMATION DISSEMINATION DURING THE 1977 DROUGHT EMERGENCY, Utah Center for Water Resources Research,

L. D. James, and W. H. Andrews. L. D. James, and W. H. Andrews.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 474,
Price codes: A13 in paper copy, A01 in microfiche.
Utah Water Research Laboratory, Water Resources Planning Series Report P-78-002, June
1978. 235 p, 27 tab, 3 append. OWRT T-0021(7706).

Descriptors: *Droughts, *Water conservation, Range management, *Water harvesting, Water reuse, Groundwater mining, Irrigation, Erosion, *Information exchange, *Information dissemination, Water distribution(Applied), Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

As drought conditions in 1976 and 1977 became increasingly severe throughout the west and affected many other parts of the country, many states began special drought information dissemination efforts. This study was organized to provide a forum for the exchange of information among the respective states that could reduce duplication among independent efforts. The project collected information on: (A) Water-user conservation practices, (1) domestic use, (a) inside use, (b) outside use, (2) industrial, (3) commercial, and (4) irrigation; (B) Water-supplier management practices, (1) water conservation inducements, (2) emergency water conservation inducements, (2) emergency supply augmentation, (a) groundwater mining, (b) water harvesting, (c) water reuse, (3) reallocation among uses or users; (C) special drought problems, (1) livestock and range management, (2) effects on fish and wildlife, (3) fire danger, (4) effects on recreation, (5) energy effects (reduced generation and additional use), (6) effects of resulting changes and additional use), (6) effects of resulting changes in water quality including salinity, and (7) wind erosion. Types of information included (1) research results contributing to dealing more effectively with emergency drought situations, (2) research currently underway, (3) brochures or other material prepared for public distribution, (4) reports of extension agents or other technical personnel working with the public to solve drought problems, and (5) user or expert statements recomlems, and (5) user or expert statements recom mending supplementing or revising any of the above. This report contains 667 abstracts and a snythesis of the information obtained on each W79-02904

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BEST MANAGEMENT PRACTICES' FOR SA-LINITY CONTROL IN GRAND VALLEY, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering. For primary bibliographic entry see Field 5G. W79-02521

SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS 1976, SIXTH ANNUAL ISSUE, Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. For primary bibliographic entry see Field 10C. W79-02580

EVALUATION OF IRRIGATION METHODS FOR SALINITY CONTROL IN GRAND VALLEY, Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. For primary bibliographic entry see Field 5G. W79-02594

IMPLEMENTATION OF AGRICULTURAL SA-LINITY CONTROL TECHNOLOGY IN GRAND VALLEY, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering. For primary bibliographic entry see Field 5G. W79-02617

INTEGRATING DESALINATION AND AGRICULTURAL SALINITY CONTROL ALTERNA-

IIVES, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering. For primary bibliographic entry see Field 5G. W79-02629

LAS VEGAS VALLEY WATER BUDGET: RE-LATIONSHIP OF DISTRIBUTION, CON-SUMPTIVE USE, AND RECHARGE TO SHAL-LOW GROUNDWATER, Nevada Univ. System, Las Vegas. Desert Re-

For primary bibliographic entry see Field 5G. W79-02728

DEVELOPING PROCEDURES FOR PREDICTING EFFECTIVENESS IN SEEPAGE CON-TROL,

Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4A.
W79-02820

RESPONSES OF BERMUDAGRASS TO SALIN-

TTY, California Univ., Riverside. Dept. of Plant Sci-

R. C. Ackerson, and V. B. Youngner. Agronomy Journal, Vol. 67, No. 5, p 678-681, September-October 1975. 6 tab, 27 ref.

Descriptors: *Bermudagrass, *Crop response, *Salinity, Turf grasses, Turf, *Salt tolerance.

Bermudagrasses are salt-tolerant grasses valuable for forage and turf. Experiments were conducted to determine specific responses to increasing salinity to provide a basis for breeding of more salt tolerant, agronomically desirable strains. The culti-

var 'Santa Ana' was grown in solution cultures containing increasing levels of NaCl and CaCl2 or K2SO4. Dry weight of tops decreased while dry weight of roots and total nonstructural carbohydrate concentrations of crowns, but not roots, increased with increased salinity of the culture solution. (Skogerboe-Colo St) W79-02993

3D. Conservation In Domestic and Municipal Use

A PROCEDURE TO DETERMINE DIRECT DI-VERSIONS FROM LAKE MICHIGAN,

Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
J. W. Male, and K. Soliman.

J. W. Maie, and K. Soliman. Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 365, Price codes: A04 in paper copy, A01 in microfiche. University of Illinois Water Resources Center, Urbana, Research Report No. 137, October 1978. 71 p, 8 fig. 12 tab. 3 ref. S-061-ILL.

Descriptors: *Mathematical models, *Optimization, Water utilization, Regulated flow, Diversion, Flow augmentation, Decision making, Water management, Water resources, Water quality, *Lake Michigan, *Diversion, *Illinois, *Algo-

Illinois diverts water from Lake Michigan to the Chicago River and Canal System in three primary ways: (1) diversions for municipal water supply, (2) storm water diverted away from the lake, and (3) direct diversions primarily for water quality purposes. The U.S. Supreme Court has ruled that the total average diversion must not exceed 3200 cfs. Since the stormwater diversion is uncontrollable, by reducing the amount necessary for direct diversion, the diversion available for municipal use can be increased. An optimization procedure, utilizing an efficient network algorithm, is developed to determine the average monthly flowrates at the three diversion points on Lake Michigan. The algorithm minimizes the total amount diverted that is necessary to maintain the dissolved oxygen standgorithm minimizes the total amount diverted that is necessary to maintain the dissolved oxygen standard in the waterway system. The procedure is applied to evaluate direct diversion needs under existing conditions and after installation of ten instream aeration stations. Results show the need for large diversions during the summer months and primarily at one diversion point. The installation of instream aerators reduces the need for direct diversions by approximately 25 percent.

W79-02523

HYDROLOGIC DATA FOR URBAN STORM RUNOFF FROM THREE LOCALITIES IN THE DENVER METROPOLITAN AREA, COLORA-

Geological Survey, Lakewood, CO. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02646

NEW CONSIDERATIONS FOR MUNICIPAL WATER SYSTEM PLANNING,

Montgomery (James M.)
For primary bibliographic entry see Field 6B.
W79-02729

IRRIGATION OF URBAN LAWNS, Colorado State Univ., Ft. Collins. Dept. of Agri-cultural and Chemical Engineering.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 393, Price codes: A05 in paper copy, A01 in microfiche. MS Thesis, Spring 1978. 80 p. 7 fig, 8 tab, 25 ref, 2 append. OWRT B-035-WYO(3).

Descriptors: Irrigation, *Evapotranspiration, Urban lawns, *Lawn irrigation, Sprinkler irrigation, *Lysimeters, Measurement, Cities, *Urbanization, Water utilization, *Colorado.

Using small weighable lysimeters, evapotranspiration of urban lawns was measured in Fort Collins and Northglenn, Colorado during the summer of 1977. The measured data were compared with the Modified Blaney-Criddle equation estimated evapotranspiration lower than the measured data. The Jensen-Haise equation predicted weekly evapotranspiration reasonably well, provided allowance was made for plant stress, growth stage and availability of water after an irrigation. Lawn irrigation practices of the residents of 57 homes in Fort Collins and Northglenn were studied in the summer of 1977. The water applied to the lawns and gardens of these homes was measured. The total water supplied to 30 homes in Northglenn was also measured. Lawn water application rates were compared to: (1) measured evapotranspiration; (2) physical appearance of lawns, and (3) total residential water use. Recommendations are made concerning lawn water application rates in Denver and the use of small lysimeters and water meters in urban lawn studies. These recommendations are: (1) investigate the accuracy of using shallower lawn sizes and outside water use patterns more accurately, and (3) compile an instruction more accurately. mine lawn sizes and outside water use patterns more accurately, and (3) compile an instruction manual for urban lawn irrigation. W79-02832

3E. Conservation In Industry

ELIMINATION OF WATER POLLUTION BY RECYCLING CEMENT PLANT KILN DUST, Portland Cement Association, Skokie, IL. For primary bibliographic entry see Field 5D. W79-02509

RESOURCE DEMANDS FOR ENERGY DE-VELOPMENT IN THE YELLOWSTONE RIVER BASIN, CH2M/Hill, Sacramento, CA.; and North Dakota

State Univ., Fargo. For primary bibliographic entry see Field 6D. W79-02726

FACTUAL INPUTS FOR ALLOCATION DECI-SIONS CONCERNING SCARCE WATER RE-

SIONS CONCERNING SCARCE WATER RE-SOURCES, Washington Univ., St. Louis, MO. Dept. of Tech-nology and Human Affairs. For primary bibliographic entry see Field 6B. W79-02731

ENERGY RESOURCES (COLORADO RIVER BASIN), DEVELOPMENT, Department of the Interior, Washington, DC.

J. Carter.

In: Values and Choices in the Development of the Colorado River Basin, edited by D. F. Peterson and A. B. Crawford, p. 144-155, 1978. University of Arizona Press, Tucson. 1 fig. 1 tab.

Descriptors: *Energy, *Colorado River basin, *River basin development, Fossil fuels, Coals, Oil shales, Solar energy, Geothermal energy, Economics, Government, Hydroelectric power, Energy budget, Economic impact, Economic justification, Economic feasibility, Political constraints, Water resources development.

Projections for future energy needs have led to increased interest in the energy resources of the Colorado River Basin. Accordingly, the U. S. Department of the Interior has created an energy policy for future development by encouraging coal and oil shale technology and resources data throught leasing programs and r and d projects. Although solar, geothermal, coal, and oil shale development of the area is expected, it is this author's contention that these efforts, along with conservation programs, will not greatly alter the energy situation sufficiently to avoid an increased dependence on foreign sources by 1980. Even though oil, gas, and hydroelectric power is available in the Basin, developmental and environmental problems make it doubtful that these resources will be a major source of energy for the next several Projections for future energy needs have led to

Field 3-WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3E-Conservation In Industry

years. The Federal Government, nevertheless, is moving quickly to faciliate the development of the region's energy resources at acceptable economic and environmental costs, regardless of the difficulty of the decisions that must be made. Water, costs, and socioeconomic problems of the Basin's development form the basin of this discussion. (See also W79-02732). (Tickes-Arizona).

PROBABILISTIC ANALYSIS OF WATER AVAILABILITY IN POWER PLANT SITE SE-LECTION, Arizona Univ., Tucson. Dept. of Nuclear Engi-

neering. D. M. Wong.

D. M. Wong. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 407, Price codes: A04 in paper copy, A01 in microfiche. MS Thesis, 1974. 63 p. 13 ref, 2 append. OWRT A-043-ARIZ(2), 14-31-0001-4003.

Descriptors: *Cooling water, Information retrieval, *Nuclear powerplants, Water reuse, *Probability, *Sites, *Powerplant site selection, Water supply, Water availability, *Forecasting, *Arizona, Groundwater basins, Water demand, Projections,

A method of probabilistic analysis of long-term water availability for power plant site selection was developed. A standard site selection process was followed, in which the factors affecting siting was followed, in which the factors affecting siting were identified, weighted by their importance, and compared by location, the basic techniques being the system screening and ranking processes. The potential physiographic/groundwater basins were initially screened with reference to specific site selection requirements. Then a probabilistic value predicting water availability of sufficiency was obtained, by (1) estimating and projecting the quantity of water available in each candidate valley for the lifetime of the plant (assumed to be 30 years) by a probabilistic mathematical model; and (2) calculating the total quantity of cooling water reby a probabilistic mathematical model; and (calculating the total quantity of cooling water required for the lifetime of the plant, by estimating the annual cooling demand assuming a 1000 MW light water reactor power plant design. Twenty-four groundwater basins in Arizona were listed as potential areas where groundwater storage may be sufficient as a source of supply for the projected 30-year life of a power plant. After screening with respect to land availability and seismic characteristics, the list was reduced to seven basins or valleys, of which three were then selected arbitrarily for detailed examination. W79-02834

3F. Conservation In Agriculture

ASSESSING THE SPATIAL VARIABILITY OF IRRIGATION WATER APPLICATIONS,

Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering.

D. Karmeli, L. J. Salazar, and W. R. Walker. Publication No. EPA-600/2-78-041, March, 1978. 201 p, 38 fig, 25 tab, 71 ref, 6 append.

Descriptors: *Irrigation efficiency, *Sprinkler irrigation, *Irrigation practices, *Irrigation water, gation, *Irrigation.
Trickle irrigation.

The current state of the art regarding the spatial distributions of irrigation water applications under surface, sprinkler, and trickle irrigation systems has surface, sprinkler, and trickle irrigation systems has been assessed. The analyses found in the literature and several new uniformity concepts have been integrated into models which can be used in both field and research applications. These models simulate the spatial distributions of applied irrigation water under specified design and operating conditions. The performance of an irrigation system has been described by a series of 'quality' parameters relating to: (1) uniformity in an irrigated field; (2) adequacy of the irrigation system in meeting crop requirements; (3) volume of applied water wasted as deep percolation; and (4) in the case of surface irrigation, the water leaving the field as tailwater. Verification of the models developed during this

project was made against most of the data identified in the literature as well as an intensive collection effort as part of this project. The results illustrate both the use of the analytical approach and the procedures for field data collection. (Skogerboe-Colorado State)

A PROGRAM TO PROMOTE IRRIGATION CONSERVATION IN IDAHO, Idaho Dept. of Water Resources, Boise.

J. R. Hammond. March 1978, 43 p. 6 fig.

Descriptors: *Irrigation efficiency, *Irrigation conservation, Irrigation incentives, *Idaho, Idaho Irrigation Conservation Program, Water delivery organizations, Water law, Costs, Benefits, *Water

Studies have shown that many irrigators in Idaho employ more water conserving systems and prac-tices than others. Similar observations have been tices than others. Similar observations have been made among water delivery organizations. While physical considerations influence the extent that more efficient systems and practices are employed, they do not fully explain differences in irrigation efficiency. Economic, social, legal and institutional factors are examined to determine their effects on irrigation efficiency. The direct and indirect costs factors are examined to determine their effects on irrigation efficiency. The direct and indirect costs and benefits of improving irrigation efficiency are discussed. The benefits which some users may derive from the waste, seepage or return flow waters of others are also discussed. The right to conserve and use conserved water is examined. The trend toward the adoption of water conserving improvements in Idaho is discussed. The impacts of existing state and federal programs on irrigation conservation are examined. A goal for irrigation conservation is defined to include the positive and negative impacts of improving efficiency. Three levels of emphasis (low, moderate, aggressive) are compared for developing a state irrigation conservation program in light of the irrigation conservation goal. Based on the evaluation of the three programs it is recommended that a low emphasis program hot be implemented until the positive and negative impacts of improving irrigation efficiency can be more clearly established. lished W79-02671

OPTIMIZING IRRIGATION SYSTEM DESIGN. Idaho Dept. of Water Resources, Boise

G. D. Galinato, J. R. Busch, and C. E. Brockway. Completion Report, June 1977. 266 p, 20 ref, 5 append. Bur. Reclam. 14-06-100-9087.

Descriptors: *Irrigation systems, *Optimization, Planning, Rehabilitation, *Idaho, Cost analysis, *Irrigation efficiency, *Irrigation design.

A method of rapidly obtaining optimal irrigation system designs has been developed for use by planning personnel of the Bureau of Reclamation, Pacific Northwest Region. The method allows planners to obtain optimal system designs for various specified irrigation efficiencies and water costs and to rapidly evaluate the effects of changes in these parameters in conjunction with physical and socioeconomic constraints. Cost estimating routines are used to obtain annual costs associated with canal and pipeline sections, pumping units and on-farm application systems. The optimization procedure is a two-stage dynamic-linear programming approach. Dynamic programming is first used to eliminate undesirable conveyance system components, and linear programming is then used to obtain the optimal system design of all conveyance and application components. Component and and application components. Component and water costs and various constraining conditions are easily changed in the linear-programming problem to allow planners to evaluate many aspects in multi-objective planning. The entire procedure has been used to develop alternative plans for a portion of a Bureau project. The results obtained are least cost systems that are compatible with Bureau planning guidelines. The procedure may be used for

developing optimal system plans for rehabilitation projects as well as for new projects. projects as 1 W79-02672

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF NUTRIENTS, A RAINFALL SIMU-LATION STUDY, Iowa Natural Resources Council, Des Moines. For primary bibliographic entry see Field 4C. W79-02680

SOCIAL OVERHEAD CAPITAL COSTS OF IR-RIGATION DEVELOPMENT IN WASHING-TON STATE,

Washington State Univ., Pullman. Dept. of Agri-cultural Economics.

N. K. Whittlesey, K. C. Gibbs, and W. R. Butcher. Water Resources Bulletin, Vol. 14, No. 3, p 663-678, June 1978. 2 fig. 4 tab, 7 ref.

Descriptors: *Irrigation development, *Energy, *Social overhead costs, Water resources, Capital costs, Columbia Basin(Washington), Projects, Taxes, Utility rates, Demand.

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Increased irrigation as a means of achieving economic development can impose significant social costs on the state or region of growth. The growth in population induced by additional irrigation will require new roads, water and sewage facilities, schools, fire and police protection, and so forth. Also, the increased energy demands due to irrigation and growth in economic activity must be met. Capital investments required to service these needs of new development can become very large. This study attempts to measure such social overhead costs or irrigation development for some specific irrigation project areas of Eastern Washington. It is shown that investment costs in overhead items can reach \$2,000 per acre irrigated or \$70,000 per job created. Alternatively, the annual costs can equal \$180 per acre or \$6,700 per worker. These costs must be paid locally through increased taxes, utility rates, or costs for services. (Bell-Cornell) W79-02719

FACTUAL INPUTS FOR ALLOCATION DECISIONS CONCERNING SCARCE WATER RE-

SIONS CONCERNING SCARCE WATER RE-SOURCES, Washington Univ., St. Louis, MO. Dept. of Tech-nology and Human Affairs. For primary bibliographic entry see Field 6B. W79-02731

THE ROLE OF AGRICULTURE, (COLORADO RIVER BASIN),
New Mexico State Univ., University Park.

New Mexico State Univ., Olivering values

In: Values and Choices in the Development of the
Colorado River Basin, ed. by D. F. Peterson and
A. B. Crawford, p 156-172. University of Arizona
Press, Tucson. 1978. 1 tab, 1 fig, 23 ref.

Descriptors: *Colorado River Basin, *Land use, *Agriculture, *Multiple purpose, Foods, Land tenure, Variability, River basin development, Economic justification, Alternative planning, Planning, Puture planning(Projected), Regional analysis, Economic impact, Cost-benefit analysis, Economic feasibility, Grazing.

The demand for land to develop energy, mineral, recreational, and environmental resources in the Colorado River Basin is expected to increase comcolorado River Basin is expected to increase competition with agricultural and grazing enterprises. Conversely, need for food and fiber, as well as the U.S. reliance on agricultural exports for foreign exchange, are external forces being exerted upon the allocation of the region's lands. Here the context in which agricultural decisions, public and text in which agricultural decisions, public and private, must be made, and the relation of these to the resource base of the region are reviewed. Uncultivated lands account for the largest acreage in the Basin, and are of use for timber production, livestock grazing, recreation, wildlife, wilderness, watersheds, and minerals. Land use and management decisions on these lands are complicated by three major factors: (1) land ownership patterns,

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Control Of Water On The Surface—Group 4A

(2) extreme variability in climate, soils, vegetation, and topography, and (3) multiple-use possibillities. In termas of land area, the dominant agricultural use in the region is for grazing and timber. Prospects and problems involving the water and energy demands on these uncultivated lands of the Basin are reviewed. (See also W79-02732). (Tickes-Ari-W79_02738

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6B.

SOIL AND WATER LOSS FROM CONSERVA-TION TILLAGE SYSTEMS, Science and Education Administration, Ames, IA. North Central Region. J. M. Laflen, J. L. Baker, R. O. Hartwig, W. F. Buchele, and H. P. Johnson. Transactions of the American Society of Agricul-tural Engineers, Vol. 21, No. 5, p. 881-885, Septem-ber-October 1978. 5 fig, 2 tab, 11 ref.

Descriptors: *Soil erosion, *Runoff, *Iowa, *Farm management, *Soil conservation, Sediments, Mulching, Corn, Simulated rainfall, Soils, Soil types, Rainfall, Crops, Agriculture, *Tillage practices, Residue cover.

A rainfall simulator was used to evaluate the effects of 6 different tillage practices on soil and water losses from continuous corn for 3 soils in Iowa. Soil loss decreased as tillage decreased. Percent of soil covered by corn residue explained between 78 and 89% of the variance in erosion among tillage systems. The effect of nonuniformly distributed corn residue on controlling erosion was greater than expected based on a published mulch factor. Runoff amounts decreased as residue cover increased for 2 of the 3 soils studied. No critical slope length limits were found for the tillage pracincreased for 2 of the 3 soils studied. No critical slope length limits were found for the tillage practices, soils, slopes, and slope lengths studied except for till-planting on the Ida soil. As sediment concentrations increased, mean sediment size increased for one soil, decreased for a second soil, and was unrelated to sediment concentration for the third soil. (Sims-ISWS) W79-02852

GRAVITY-FLOW IRRIGATION AND THE SPREAD OF AQUATIC WEEDS IN SUDAN, Gezira Univ., Wad Medani (Sudan). Dept. of Biological Sciences.

For primary bibliographic entry see Field 4A. W79-02930

RESISTANCES TO WATER TRANSPORT IN

RICE PLANTS,
Govind Ballabh Pant Univ. of Agriculture and
Technology, Pantnagar (India).
For primary bibliographic entry see Field 2I.
W79-02986

YIELD AND QUALITY OF CORN AND GRAIN SORGHUM GRAIN AND RESIDUES AS INFLUENCED BY N FERTILIZATION, Nebraska Univ., Lincoln. Dept. of Agronomy. L. J. Perry, Jr., and R. A. Olson. Agronomy Journal, Vol. 67, No. 6 p 816-818, November-December 1975. 3 tab, 12 ref.

Descriptors: *Grain sorghum, Corp response, *Corn(Field), *Nitrogen, *Fertilizers, *Fertilization, *Crop production, *Crop residues.

Crop residues of grain sorghum and corn have attracted attention as an alternate economical forage resource for livestock utilization. There are little data available on agronomic production factors affecting yield and quality of crop residues. The effect of rate and time of N fertilization on the contract of the con irrigated corn and grain sorghum grain and residue yields, grain N content, and forage quality of the residues was evaluated. It was concluded that N rate and time of application do affect yield and quality of row crop residues. (Skogerboe-Colo St) W79-02987

RESPONSE CURVES OF VARIOUS TURF-GRASSES TO APPLICATION OF SEVERAL

CONTROLLED-RELEASE SOURCES. NITROGEN

SOURCES, Florida Univ., Gainesville. Dept. of Soil Science. G. M. Volk, and G. C. Horn. Agronomy Journal, Vol. 67, No. 2, p 201-204, March-April 1975. 6 fig. 9 ref.

Descriptors: Turf, *Turf grasses, *Nitrogen, *Fertilizers, Fertilization, Ureas, *Crop response, Crop production.

Responses of turfgrasses to controlled-release N sources, especially the newer materials have not been adequately evaluated under field conditions. This study obtained N time-release curves as measured by clippings taken periodically after the initial response to readily available N such products contain had subsided. Materials were surface-applied once, or at widely spaced intervals, to six different turfgrasses. Three to 4-day growth clippings were taken periodically to assess current N uptake rate against that from a standard treatment consisting of a continuous, uniform, weekly application of NH4NO3. Sulfur-coated urea gave the most desirable response for summer fertilization, followed by isobuthlidene diurea (IBOU), activited sewage sludge and urea form. IBOU was superior to the other materials for winter usage. (Skogerboe-Colo St) W70 02000

SOYBEAN YIELDS AND LANCE NEMATODE POPULATIONS AS AFFECTED BY SUBSOILING, FERTILITY, AND NEMATICIDE TREAT-

Agricultural Research Service, Tifton, GA. Coast-al Plain Station.

M. B. Parker, N. A. Minton, O. L. Brooks, and C.

Argonomy Journal, Vol. 67, No. 5, p 663-666, September-October 1975. 1 fig, 5 tab, 13 ref.

Descriptors: *Soybeans, Crop response, *Nematodes, Fertilization, Nematicides, Soil compaction, *Crop production.

Soil compaction, Nematode damage, and fertility problems occurring singly and in combination appear to be responsible for low yields of soybeans in some Coastal Plain soils. This study was designed to determine if these conditions could be orrected with certain fertility treatments, subsoiling, and a nematicide. Results indicate the importance of the nematicide, 1,2-dibromo-3-chloropropane, and subsoiling for soybean production on compacted soils infested with lance nematodes. (Skogerboe-Colo St) W79-02989

THE RECOVERY OF LEAF WATER POTENTIAL, TRANSPIRATION, AND PHOTOSYNTHESIS OF COTTON DURING IRRIGATION CYCLES.

Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). For primary bibliographic entry see Field 2D. W79-02990

EFFECT OF IRRIGATION, LIME, AND FER-TILITY TREATMENTS ON THE YIELD AND CHEMICAL COMPOSITION OF SOYBEANS, Virginia Polytechnic Inst. and State Univ., Blacks-

J. A. Lutz, Jr., and G. D. Jones. Agronomy Journal, Vol. 67, No. 4, p 523-526, July-August 1975. 6 tab, 5 ref.

Descriptors: *Soybeans, *Crop response, *Nutrients, *Fertilization, Potassium, Phosphorus, Irrigation, Irrigation effects, *Lime, *Micronutrients.

Data are available on the effects of surface applied plant nutrients on the yield, quality, oil, and protein contents of soybean seed and on the chemical composition of the soybean leaves. Very little information is available, however, on the effects of irrigation and plow sole (30.5 cm) placement of plant nutrients on these same plant characteristics. In order to determine the effects of irrigation and

plow sole placement of P, K, lime, and micronutrients on the quality, yield, oil, and protein contents of soybean seeus and on the chemical composition of the leaves, a field experiment was conducted for 3 consecutive years. Soybean seed yields were increased each year with irrigation. Yields were unaffected by P and K treatments during the first 2 years, but in the thirty year, yields were lower where P and K had not been applied on the plow sole. Lime and micronutrients did not significantly affect yield. Irrigation increased the oil content but did not effect the protein content. Leaf P and K concentration were unaffected by irrigation but were affected by P and K applications. (Skogeboe-Colo St)

EFFECT OF IRRIGATION AND NITROGEN ON THE DRY MATTER AND CRUDE PROTEIN YIELDS OF 'PANGOLA' DIGITGRASS, University of the West Indies, St. Augustine (Trinidad). Dept. of Soil Science.
L. Byam, and F. A. Gumbs.
Agronomy Journal, Vol. 67, No. 3, p 365-369, May-June 1975. 6 tab, 14 ref.

Descriptors: *Grasses, *Forage grasses, Irrigation effects, Irrigation, Crop response, Crop production, *Dry farming, Dry seasons, Fertilizers, *Fertilization, *Nitrogen, Loam, Sands, *Pangola digitation, *Nitrogen, *

In Trinidad, West Indies, a dairy industry is being developed on Piarco fine sand/fine sandy loam soil. The soil is physically and chemically poor. The cattle obtain most of their food supply by grazing 'Pangola' digitgrass. There is an urgent need to increase grass production on this soil type. Inadequate water supply in the dry season limits grass production. Previous fertilizer trials with Pangola digitgrass on this soil type have indicated that N fertilizer is likely to give better yield response than P, K, or Ca. This trial was therefore conducted to determine the irrigation-N management for wet and dry season production of Panment for wet and production of the pr ment for wet and dry season production of Pan-gola digitgrass on this soil at adequate levels of P and K. (Skogerboe-Colo St) W79-0292

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

A PROCEDURE TO DETERMINE DIRECT DI-VERSIONS FROM LAKE MICHIGAN, Illinois Inst. of Tech., Chicago. Dept. of Environ-

mental Engineering.
For primary bibliographic entry see Field 3D.
W79-02523

CALIFORNIA'S PROGRAM FOR DEALING WITH THE DROUGHT, California State Dept. of Water Resources, Sacra-

For primary bibliographic entry see Field 6E. W79-02544

SURFACE WATER FLOODING IN URBAN AREAS: RIGHTS AND REMEDIES UNDER THE COMMON ENEMY DOCTRINE, For primary bibliographic entry see Field 6E. W79-02552

THE DEVELOPMENT OF FLOOD-POTENTIAL INDEX MAPS FOR PENNSYLVANIA, Pennsylvania State Univ., University Park. Dept. of Civil Engineering. G. Aron, D. F. Kibler, and C. J. Tagliati. Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 391, Price codes: A06 in paper copy, A01 in microfiche.

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control Of Water On The Surface

Institute for Research on Land and Water Resources Research, Penn State Univ., Project Technical Completion Report, Dec 1978. 98 p, 19 fig, 11 tab., 23 ref. 3 append. OWRT A-049-PA(1), 14-34-

Descriptors: *Flood peak, *Flooding, *Pennsylva-nia, Urbanization, *Maps, *Population density, *Streamflow regulation, *Flood indices, *Flood potential, Index maps, Gaged watersheds, Un-gaged watersheds, Return period.

gaged watersheds, Return period.

Flood-potential index maps were developed for Pennsylvania. Flood indices were computed for gaged watersheds by dividing the 100-year and the 2.33-year flood peaks by the watershed area contributing to flooding. It was found that Q2.33 is proportional to A0.8 and Q100 is proportional to A0.7. Flood indices were plotted on maps broken down into three area ranges and two return periods. A procedure was developed using the flood-potential index maps to estimate peak floods for ungaged watersheds. The square of the inverse distance to nearby flood index location is used as a weighting factor. The flood index is estimated for the 100-year and the 2.33-year return period and the corresponding flood peaks are computed. A nomograph is provided to obtain flood peaks for return periods between 2.33- and the 100-year periods. The effect of streamflow regulation on flood peaks was studied. Various approaches to correct flood indices for streamflow regulation were tried. A preliminary study of the effect of urbanization on flood peaks was also made. Population density was used as a parameter in the correction of flood indices. (Sink-Penn State)

UNSTEADY STREAMFLOW SIMULATION USING A LINEAR IMPLICIT FINITE-DIFFERENCE MODEL,

Geological Survey, NSTL Station, MS. Water Resources Div

For primary bibliographic entry see Field 2E.

IMPACT OF FLOW REGULATION AND POWER PLANT EFFLUENTS ON THE FLOW AND TEMPERATURE REGIMES OF THE CHATTAHOCHEE RIVER - ATLANTA TO WHITESBURG, GEORGIA,

Geological Survey, Doraville, GA. Water Re-

For primary bibliographic entry see Field 5B. W79-02648

METHODS FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS IN AR-IZONA.

Geological Survey, Tucson, AZ. Water Resources

For primary bibliographic entry see Field 2E.

A RAINFALL-RUNOFF MODELING PROCE-DURE FOR IMPROVING ESTIMATES OF T-YEAR (ANNUAL) FLOODS DRAINAGE BASINS.

Geological Survey, Lakewood, CO. Water Resources Div.

For primary bibliographic entry see Field 2E. W79-02652

TRANSIT LOSSES AND TRAVELTIMES OF RESERVOIR RELEASES ALONG THE AR-KANSAS RIVER FROM PUEBLO RESERVOIR TO JOHN MARTIN RESERVOIR, SOUTH-EASTERN COLORADO,

Geological Survey, Lakewood, CO. Water Resources Div.

R. K. Livingston

Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 129, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 78-75, September 1978. 30 p, 8 fig, 8 tab, 14 ref.

Descriptors: "Water management(Applied), "Reservoir operation, "Reservoir releases, "Streamflow, "Flow control, Computer models, Streamflow forecasting, Diversion, Water loss, Surfacegroundwater relationships, Aquifer characteristics, Channel morphology, Hydrologic data, Time of travel, "Colorado, "Arkansas River reservoirs(Colo)

The volumes of reservoir releases are decreased or delayed during transit by bank storage, channel storage, and evaporation. Results from a computer model, calibrated by a controlled test release from Pueblo Reservoir, Colo., indicate that transit losses are greatest for small releases of a short duration when made during periods of low Antecedent streamflow. For equivalent releases, transit losses during the winter are about 7 percent less than losses during the summer. Based on available streamflow records, the velocity of reservoir releases ranges from about 0.6 miles per hour at the downstream end of the study reach, when antecedent streamflow is 10 cubic feet per second, to about 6.8 miles per hour at the upstream end of the study reach, when antecedent streamflow is 3,000 cubic feet per second. Consequently, the traveltime of a release increases as antecedent streamflow diminishes. Management practices that may be used to benefit water users in the study area include selection of the optimum time, rate, and duration of a reservoir release to minimize the transit losses, determination of an accurate traveltime, and diverdetermination of an accurate traveltime, and diver-sion at several incremental rates. (Woodard-W79-02659

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977--VOLUME 2, RED RIVER BASIN.

Geological Survey, Oklahoma City, OK. Water For primary bibliographic entry see Field 7C. W79-02665 Resources Div

WATER RESOURCES DATA FOR ARKANSAS, WATER YEAR 1977.

Geological Survey, Little Rock, AR. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02666

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977-VOLUME 1. ARKAN-SAS RIVER BASIN.

Geological Survey, Oklahoma City. OK. Water For primary bibliographic entry see Field 7C. W79-02667 Resources Div.

WATER RESOURCES DATA FOR WEST VIR-GINIA, WATER YEAR 1977.

Geological Survey, Charleston, WV. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02668

EVALUATION OF LINER MATERIALS EX-POSED TO LEACHATE,

Matrecon, Inc., Oakland, CA.
For primary bibliographic entry see Field 8G.
W79-02704

ASSESSMENT AND IMPLEMENTATION OF IN-STREAM VALUE STUDIES FOR THE NORTHERN GREAT PLAINS, MONTANA Univ., Missoula. Dept. of Geology.
A. J. Silverman, and L. Parrish.

A. J. Silverman, and L. Parrish.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-255 272,
Price codes: A08 in paper copy, A01 in microfiche.
Second Annual Report, Prepared for Environmental Protection Agency, 1974. 35 fig, 42 tab, 53 ref,
3 append, 1 plate. EPA-68-01-2653.

Descriptors: *Montana, *Stream flow, *Sediment transport, *Fish types, *Aquatic environment,

*Bathymetry, *Ice cover, Low flow, Velocity, Aquatic insects, Aquatic life, Mapping, Montana, *Tongue River(Mont).

The objective of this study included the implementation of a methodology for the recommendation of minimum streamflow on a medium sized river containing a warm water fish community; an evaluation of the suitability of the methodology; and an evaluation of flow criteria, including nonbiotic factors, used in making the flow recommendation. Flow criteria for the recommendation of minimum streamflows were established using the stonecat as an indicator species. Fish distribution as related to major habitat areas, instream flow needs, and proposed coal development were examined as were the in-stream requirements of the benthic macroinvertebrates. The Tongue River in Montana was used for the study. (Lardner-ISWS)

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LAKE PROCESS MODELS APPLIED TO RES-ERVOIR MANAGEMENT.

URS Corp., San Mateo, CA.
For primary bibliographic entry see Field 5A.
W79-02716

CONTROL OF 1973 MISSISSIPPI RIVER

Army Engineer District, Vicksburg, MS. R. I. Kaufman.

R. I. Kauman.
Journal of the Water Resources Planning and Management Division, Proceedings of the American
Society of Civil Engineers, Vol. 104, No. WR1, p
105-121, November 1978. 4 fig. 1 tab, 4 ref.

Descriptors: *Flood control, *Levees, *Mississippi River, Seepage, Waves(Water), Drainage, Basins, Planning, Projects, Hydrologic data, Floods, Design, Government agencies.

In 1973, a major flood occurred on the Mississippi River. Much of the alluvial valley of the river between Alton, Ill. and the Gulf of Mexico is protected against floods by Federally constructed flood control works. As some of these systems were not complete at the onset of the flood, a major flood fight was required to safeguard the valley. Many miles of levee had to be raised to provide proper protection. Other problems requiring flood-fight efforts were seepage under levees, scour at levees and structures, and riverbank failures. Even though major generate riverbank failures. ures. Even though major emergency efforts were required, the Federal flood control systems were effective and of great value in controlling the flood. The projects prevented the inundation of 26,000 sq miles (67,500 km2) of land and reduced flood damages by over \$14,000,000,000. However, the losses sustained indicate the need to complete authorized works and possibly expand existing projects or initiate new projects in some areas, both. (Bell-Cornell)

SURFACE WATER RESOURCES OF NORTH-WEST FLORIDA

Johnson (Bernard), Inc., Houston, TX. For primary bibliographic entry see Field 2E. W79-02727

VALUES AND CHOICES IN THE DEVELOP-MENT OF THE COLORADO RIVER BASIN. American Association for the Advancement of Science, Washington, DC. Committee on Arid Lands. For primary bibliographic entry see Field 6B. W79-02732

PHYSICAL SETTING, (COLORADO RIVER

California State Water Resources Control Board.

W. D. Maughan

In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 9-17, 1978. University of Arizona Press, Tucson. 1 fig, 9 ref.

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Control Of Water On The Surface-Group 4A

Descriptors: *River basin development, *Colorado River basin, *Saline water, *Water quality, Water utilization, Comprehensive planning, Regional de-velopment, Water management(Applied).

velopment, Water management(Applied).

The climate of this great river basin, draining nearly a quarter of a million square miles, from Myoming to Mexico, is arid to semiarid, with percipitation ranging from more than 50 inches in the higher northern mountains drown to less than 4 inches in the southern desert. The geology of the basin accounts for its tremendous salt deposits, many of which are exposed to erosion or to contact with percolating waters, thus contributing to the salt load of the river itself. It is now generally acknowledge that for all practical purposes the water supply of the river is completely depleted, since only minor quantities of essentially unusable water reach the Guld of California. While the basin has been effectively converted into an immense continental resource for man's use, increasing attention to the consequences of this use is now being paid. Unless great care is taken, the salinity problem will be amplified by actions associated with untapping the great energy resources of the upper basin, especially if mass development of oil shale and coal reserves occurs. Any long range solution to the problems of the Colorado River Basin lies outside the control of any one of the several states through which it flows, and basin-wide planning must be initiated by one means or another. (See also W79-02732) (Paylore-Arizona). W79-02733

COLORADO RIVER DEVELOPMENT, (COLO-RADO RIVER BASIN), Upper Colorado River Commission, Salt Lake City, UT. For primary bibliographic entry see Field 6E. W79-02734

POLITICS OF WATER ALLOCATION, (COLO-RADO RIVER BASIN), Arizona Univ., Tucson. For primary bibliographic entry see Field 6E. W79-02735

DEVELOPMENT.

ENERGY RESOURCES DEVELOPM (COLORADO RIVER BASIN), Department of the Interior, Washington, DC. For primary bibliographic entry see Field 3E. W79-02737

THE ROLE OF AGRICULTURE, (COLORADO RIVER BASIN),

New Mexico State Univ., University Park. For primary bibliographic entry see Field 3F. W79-02738

COMMUNITY DEVELOPMENT, (COLORADO RIVER BASIN), California Univ., Santa Barbara. For primary bibliographic entry see Field 6B. W79-02740

CARRYING CAPACITY AND PLANNING, (COLORADO RIVER BASIN),

Utah State Univ., Logan. For primary bibliographic entry see Field 6B. W79-02741

STUDIES ON THE ECOLOGY OF A STREAM-SIDE FOREST: COMPOSITION AND DISTRI-BUTION OF VEGETATION BENEATH THE TREE CANOPY,

Illinois Univ. at Urbana-Champaign. Dept. of For-

For primary bibliographic entry see Field 2I. W79-02752

DEVELOPING PROCEDURES FOR PREDICT-ING EFFECTIVENESS IN SEEPAGE CON-

Arizona Univ., Tucson. Dept. of Soils, Water, and

Engineering.
G. R. Dutt, and D. G. Boyer.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 429,
Price codes: A02 in paper copy, A01 in microfiche.
Water Resources Research Center, University of
Arizona Project Completion Report, 1978, 8 p.
OWRT A-035-ARIZ(3), 14-31-0001-3803.

Descriptors: Soils, Seepage, Reservoirs, *Seepage control, *Soil water movement, *Forecasting, *Artizona, *Hydraulic conductivity, Alkaline soils, Soil texture, Sodium adsorption ratios, Sealing(Ponds).

texture, Sodium adsorption ratios, Sealing(Ponds).

Permeameter experiments were performed on six Arizona soils using a solution of 12.5 meq/l and varied sodium concentrations. Hydraulic conductivities for five soils were reduced 60 to 95 percent for input solutions having maximum sodium adsorption ratios (SAR) to 25. Effective soil sealing occurred even though the soils were alkaline. Sealing with sodium appears nearly irreversible at low solution concentrations and saturated conditions. The soil having the highest initial hydraulic conductivity recovered less than 20 percent of the original conductivity upon reapplication of a calcium solution. These results are useful when considering sealing small ponds by sodium application. Hydraulic conductivity changes from increases in solution SAR were described mathematically using two empirically determined parameters that appear unique for each soil at a constant concentration. The parameters found for this study, plus those found from data of previous studies, were compared using multiple regression analysis to determine the most significant soil properties in predicting conductivity changes. Soil texture has the greatest influence on the parameters. An equation derived by combining data from eleven alkaline soils was selected as best for predicting hydraulic conductivities resulting from SAR changes. Predictions should be improved if additional soil data were available for analysis.

AN ECONOMIC ANALYSIS OF ALTERNA-TIVE FEDERAL FLOOD DAMAGE ASSIST-ANCE PROGRAMS.

Cornell Univ., Ithaca, NY. For primary bibliographic entry see Field 6F. W79-02824

EFFECTS OF WATER DRAWDOWN ON THE FAUNA IN SMALL COLD-WATER RESERVOIRS,

Colorado Univ., Ft. Collins.

M. E. McAfee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 391, Price codes: A05 in paper copy, A01 in microfiche.
MS Thesis, Fall 1976. 70 p, 13 fig, 8 tab, 71 ref, append. OWRT B-132-COLO(1), 14-34-0001-6062.

Descriptors: Recreation, High country reservoir, Water management(Applied), Fishery quality, *Reservoir drawdown, *Reservoir operation, *Reservoir releases, Drawdown, Flow control, Reservoir management, Primary productivity, *Fisheries management, Invertebrates, *Colorado.

Four small, cold-water reservoirs were studied to determine the effect of drawdown on their fauna. Two of the reservoirs, Idaho Springs and Urad, had stable (non-fluctuating) water levels and two, Comanche and Eaton, were completely drawn down. Observations of reservoir and drainage basin characteristics and drawdown patterns were made, and primary productivity, invertebrate abundance, and abundance and condition of fish in the reservoir were measured. No conclusive evidence of drawdown patterns reservoir the reservoir were measured. No conclusive evidence of drawdown was found. The primary productivity values were very low and varied only slightly between the reservoirs. Invertebrate densities were relatively high in Idaho Springs, a stable reservoir, and in Comanche, a drawdown reservoir. Invertebrate densities were somewhat lower in Urad and Eaton. Fish densities were also higher in Idaho Springs and Comanche than in the other two reservoirs. Coefficients of condition for game fish were somewhat higher in Urad, a stable reser-

voir, and Eaton, a drawdown reservoir. A possible reason for these results and their implications for management are discussed. W79-02830

POLLUTION FORECAST IN STREAMS.

Missouri Univ.-Columbia. Dept. of Civil Engineer-For primary bibliographic entry see Field 5B. W79-02831

HOST SPECIFICITY OF CERCOSPORA ROD-MANII, A POTENTIAL BIOLOGICAL CON-TROL OF WATERHYACINTH,

Florida Univ., Gainesville. Dept. of Plant Pathol-

N. E. Conway, and T. E. Freeman.

Plant Disease Reporter, Vol. 61, No. 4, p 262-266,

April, 1977. 1 tab, 14 ref. OWRT A-033-FLA(2),

14-34-0001-7020.

Descriptors: *Biocontrol, *Plant pathogens, *Water hyacinth, Aquatic weeds, *Aquatic fungi, *Cercospora rodmanii.

The host specificity of the fungus Cercospora rodmanii, a pathogen of water-hyacinth (Eichhornia crassipes), was determined. The susceptibility of 85 selected plants (58 species, some with several cultivars tested) of economic and ecological importance, representing 22 families, were evaluated by both greenhouses and field test. A modified centrifugal (related plants) and varietal (economic plants) strategy was utilized in the selection of the plants to be tested. The results showed that C rodmanii is a pathogen of waterhyacinth with a limited host range. Therefore its usage as a biological control for waterhyacinth would not be expectcal control for waterhyacinth would not be expected to create problems either for plants grown commercially or for plants considered of ecological importance in Florida. (Morgan-Fla)

WATER CONSERVATION INFORMATION DISSEMINATION DURING THE 1977 DROUGHT EMERGENCY,

Utah Center for Water Resources Research.

For primary bibliographic entry see Field 3B. W79-02904

INVESTIGATION OF NATURAL SEALING PROCESSES IN IRRIGATION CANALS AND RESERVOIRS,

Idaho Univ., Moscow. E. Brockway.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 491, Price codes: A07 in paper copy, A01 in microfiche. PhD Dissertation March 1977. 126 p, 33 fig, 17 tab, 61 ref, 2 append. OWRT A-023-IDA(2).

Descriptors: *Seepage water, *Canals, Hydraulics, *Reservoirs, *Surface sealing, Water loss, *Sealing, Sediment transport, *Hydraulic conductivity, *Seepage control.

Laboratory and field studies of physical, organic, and chemical factors affecting the variations in seepage rates due to natural processes in canals and reservoirs under prolonged submergence were performed. Effective reduction of hydraulic conductivity due to sediment migration in three sand sizes with three sediment sizes was examined in laboratory columns. Sediment migration measured nontory columns. Sediment migration measured non-destructively by gamma ray scanning was com-pared with corresponding changes in hydraulic conductivity. A simplified equation relating the deposit ratio, or volume of sediment retained at any point in the column to the hydraulic conductivity was developed. Procedures for estimating changes in hydraulic conductivity of Portneuf silt-loam soils of southern Idaho due to soil-waterchemical effects were developed.

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Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control Of Water On The Surface

MULTIOBJECTIVE TRADE-OFF RISKS IN RESERVOIR OPERATION.

Iowa Univ., Iowa City. Inst. of Hydraulic Research.

T. E. Croley, II, and K. N. Raja Rao.

1. E. Croiey, II, and K. N. Raja Rao.
Preprint 2863. Paper presented at the American
Society of Civil Engineers Spring Convention and
Exhibit. Dallas, Texas, April 25-29, 1977. 26p, 4
fig. 5 tab, 14 ref. OWRT A-054-IA(3), 14-34-00016016.

Descriptors: *Management, *Multiple objective, Trade-offs, *Planning, *Reservoir operation, *Op-timization, Flood control, Recreational facilities, Sedimentation, Systems engineering,

Noncommensurate, human factor multiobjectives that are subjectively discerned and evaluated now that are subjectively discerned and evaluated now may be included in reservoir operation determina-tions through trade-off techniques. Objectives are related in terms of real trade-offs with constrained optimizations and a priori estimates of objective worth are eliminated. By repeating the constrained worth are eliminated. By repeating the constrained optimizations for many synthetic realizations of inputs, it is possible to evaluate the risk or confidence associated with each trade-off level (and associated operation policy). Bases on the subjective trade-off choices and associated reliabilities, trade-off levels for reservoir operation may be selected. The optimum operation rule is then derived (for those trade-off levels) using implicit stochastic optimization techniques already available and may be tested and modified in comprehensive reservoir models. The techniques are applied to the practical problem of the Coralville reservoir, near Iowa City, Iowa for flood control and recreation objectives in a sedimenting reservoir. W79-02915 W79-02915

GRAVITY-FLOW IRRIGATION AND THE SPREAD OF AQUATIC WEEDS IN SUDAN, Gezira Univ., Wad Medani (Sudan). Dept. of Biological Sciences. M F Reshir

Environmental Conservation, Vol. 5, No. 2, p. 143-146, Summer, 1978. 2 tab, 5 ref.

Descriptors: *Irrigation systems, *Aquatic plants, *Canals, *Artificial lakes, Agriculture, Irrigation, Wetlands, Ponds, Sudan, Ponding, Rainfall, River

The distribution of rainfall in Sudan is highly seasonal in character. The country is dependent upon its river system for perennial irrigation for reliable agricultural production. At present about 4.6 mil-lion acres (1.9 million ha) are under irrigated agriculture. In these areas, irrigation is achieved by a gravity-flow method based on hydraulic principles gravity-flow method based on hydraulic principles which take maximum advantage of land contours. It consists of hierarchies of supply and distributive canals. The lower stages of these hierarchies, called Minor-canals, produce ponding conditions and are very favorable for extensive growth of aquatic macrophytes. Mechanical methods using rakes and chains operated by hand have been used to combat weed infestations. These methods will to combat weed infestations. These methods will become unfeasible and ineffective as the present plan of irrigated agricultural development in Sudan will mean a corresponding increase in Minor-canals and extended man-made aquatic habitats. (Howard-Mass) W79-02930

ASSESSMENT OF THE PHYSICAL AND BIO-LOGICAL CHARACTERISTICS OF THE MAJOR LAKE CHAMPLAIN WETLANDS, State Univ. of New York Coll. at Plattsburgh. For primary bibliographic entry see Field 2H. W79-02937

BIOLOGICAL FOUNDATIONS OF FOREST DRAINAGE EFFICIENCY,

Akademiya Nauk SSSR, Moscow. Lab. of Forest For primary bibliographic entry see Field 2I.

A PRELIMINARY CLASSIFICATION OF WET-LAND PLANT COMMUNITIES IN NORTH-CENTRAL MINNESOTA,

CENTRAL MINNESUTA, Fish and Wildlife Service, Jamestown, ND. North-ern Prairie Wildlife Research Center. For primary bibliographic entry see Field 2I. W79-02956

4B. Groundwater Management

THE CONTAMINATION OF GROUNDWATER BY HEAVY METALS FROM THE LAND DIS-POSAL OF FLY ASH,
Notre Dame Univ., IN. Dept. of Civil Engineer-

For primary bibliographic entry see Field 5B. W79-02507

SUBSIDENCE OF LAND CAUSED BY WITH-DRAWAL OF PERCOLATING WATER IS AC-TIONABLE ON THE THEORIES OF NEGLI-GENCE AND NUISANCE IN FACT. For primary bibliographic entry see Field 6E. W79-02550

ESTABLISHING LIABILITY FOR DAMAGE RESULTING FROM THE USE OF UNDERGROUND PERCOLATING WATER: SOUTH-SOUTHWEST INDUSTRIES V. FRIENDS-WOOD DEVELOPMENT COMPANY, For primary bibliographic entry see Field 6E. W79-02555

ANALYSIS OF GRAVITY DATA FROM THE PICACHO BASIN, PINAL COUNTY, ARIZO-

Arizna Univ., Tucson. Dept. of Geosciences. For primary bibliographic entry see Field 7C. W79-02599

WATER WELLS AND SPRINGS IN PALO VERDE VALLEY, RIVERSIDE AND IMPERI-AL COUNTIES, CALIFORNIA,

Geological Survey, Laguna Niguel, Water Resources Div.

For primary bibliographic entry see Field 7C. W79-02647

GROUNDWATER IN THE NEWBERG AREA, NORTHERN WILLAMETTE VALLEY,

Geological Survey, Portland, OR. Water Resources Div. For primary bibliographic entry see Field 2F. W79-02650

LINEAR GROUND-WATER FLOW, WAVE RESPONSE PROGRAM FOR PRO-GRAMMABLE CALCULATORS. Geological Survey, Louisville, KY. Water Re-

For primary bibliographic entry see Field 2F. W79-02651

EFFECTS OF BOTTOM SEDIMENTS ON IN-FILRATION FROM THE MIAMI AND TRIBU-TARY CANALS TO THE BISCAYNE AQUIFER,

DADE COUNTY, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-sources Div. For primary bibliographic entry see Field 5B. W79-02653

PRELIMINARY EVALUATION OF THE WATER-SUPPLY POTENTIAL OF THE SPRING-RIVER SYSTEM IN WEEKI WACHEE AREA AND THE LOWER WITHLACOOCHEE RIVER, WEST-CENTRAL FLORIDA, Water Re-

Geological Survey, Tallahassee, FL. sources Div. W. C. Sinclair.

Available from the National Technical Information

Service, Springfield, VA 22161 as PB-288 074, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 78-74, June 1978. 40 p, 13 fig, 4 tab, 24 ref.

Descriptors: *Potential water supply, *Springs, *Streams, *Surface-groundwater relationships, *Saline water intrusion, Hydrogeology, Water supply, Aquifers, Potentiometric level, Flow nets, Diversion, Saline water-freshwater interface, Evaluation, Projections, *Florida, *Gulf coast, Citrus County(Fla), Hernando County(Fla).

Coastal springs and seeps, including Rainbow Springs, a tributary of Withlacoochee River, discharge as much as a billion gallons of water per day to low-lying coastal swamps and estuarine marshes along the Guld Coast of Citrus and Hernando Counties, Florida. Although Weeki Wachee Spring has long been regarded as an obvious source of freshwater supply, long-term diversion of large volumes of water from Weeki Wachee River will cause encroachment of brackish water throughout the residential canals in the lower reach of the river to about 4.4 miles below Weeki Wachee Spring. Weeki Wachee Spring is analogous to a flowering well tapping an artesian aquifer. Flow characteristics of Withlacoochee River and Rainbow Springs indicate that about 600 cubic feet per second is available on a perennial basis, disregarding the downstream requirements for control of saltwater encroachment. (Woodard-USGS) HSGS) W79-02655

PRELIMINARY APPRAISAL OF THE GEOHY-DROLOGIC ASPECTS OF DRAINAGE WELLS, ORLANDO AREA, CENTRAL FLORIDA, Geological Survey, Tallahassee, FL. Water Re-

J. O. Kimrey. Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 136, Price codes: A02 in paper copy, A01 in microfiche. Water-Resources Investigations 78-37, May 1978.

Descriptors: *Groundwater recharge, *Hydrogeology, *Drainage wells, *Aquifer characteristics, *Water quality, Aquifer management, *Florida, *Orlando area(Pla), *Floridan aquifer.

The Floridan aquifer contains two highly transmis-The Floridan aquifer contains two highly transmis-sive cavernous zones in the Orlando area: an upper producing zone about 150-600 feet below land surface and a lower producing zone about 1,100-1,500 feet below land surface. Natural head differ-ences are downward and there is hydraulic conences are downward and there is hydraulic con-nection between the two producing zones. Drain-age wells are finished open-end into the upper producing zone and emplace surface waters direct-ly into that zone by gravity. Quantitatively, their use constitutes an effective method of artificial use constitutes an effective method of artificial recharge. Their negative aspects relate to the probably poor, but unknown, quality of the recharge water. Caution is suggested in drawing definite and final conclusions on the overall geohydrologic and environmental effects of drainage wells prior to the collection and interpretation of a considerable quantity of new data. Though few ground-water pollution problems have been documented, the potential for pollution should be seriously considered in light of the probable continuing need to use drainage wells; the probable volumes and quality of water involved; and the hydraulic relations be tween the two producing zones. (Woodard-USGS) tween the two producing zones. (Woodard-USGS) W79-02656

AGRICULTURAL ESTIMATED GROUND-WATER PUMPAGE IN PARTS OF FRESNO, KINGS, AND MADERA COUNTIES, SAN JOA-QUIN VALLEY, CALIFORNIA, 1974-77,

Geological Survey, Menlo Park, CA. Water Resources Div.

H. T. Mitten.

Available from OFSS, Box 25425, Denver, CO 80225; microfiche, \$3.50; paper copy, \$25. Openfile report 78-826, September 1978. 3 p, 1 fig, 1 tab.

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WATER QUANTITY MANAGEMENT AND CONTROL—Field 4

Groundwater Management—Group 4B

Descriptors: *Groundwater, *Pumping, *Water utilization, *Irrigation, Withdrawal, Estimating, Electricity, Electric motors, *California, *San Joa-quin Valley(Calif), Groundwater pumpage.

Agricultural ground-water pumpage data are presented for 1974-77 for the area on the west side of the San Joaquin Valley in parts of Fresno, Kings, and Madera Counties, Calif., which has approximately the boundaries of the Westlands Water District. The method of estimating pumpage was based on electric-power consumption at the agricultual wells. (Woodard-USGS) W79-02658

FEASIBILITY OF WATER-SUPPLY DEVELOP-MENT FROM THE UNCONFINED AQUIFER IN CHARLOTTE COUNTY, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-

Geological Survey, Tallahassee, FL. Water Resources Div.
R. M. Wolansky.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 220, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 78-26, April 1978. 34 p, 13 fig, 3 tab.

Descriptors: *Groundwater resources, *Water resources development, *Water supply, *Hydrogeology, *Water quality, Evaluation, Aquifer characteristics, Groundwater movement, Transmisvity, Groundwater recharge, Shallow wells, Water yield, Water table, *Florida, Charlotte

The unconfined aquifer in Charlotte County contains some potable water over most of the county, and represents a potential source of water supply to help satisfy the increasing demands of development. An estimated 150 billion cubic feet of relatively good quality water is stored in the unconfined aquifer. Transmissivity of this aquifer averages about 500 square feet per day, ranging from 100 to 7000 feet per day. Although recharge is primarily from rainfall, a significant amount occurs by upward movement of water from underlying confined aquifers through abandoned and flowing irrigation wells. Average annual recharge is estimated at 12 inches per year, and ranges from less than one inch to 16 inches per year. Chemical quality of the water is variable. However, chloride concentrations of water from the unconfined aquifer generally are less than 50 milligrams per liter. The area of greatest potential yield is located east of Telegraph Swamp in eastern Charlotte County. (Woodard-USGS)

DISTRIBUTION OF DISSOLVED NITRATE AND FLUORIDE IN GROUND WATER, HIGHLAND-EAST HIGHLANDS, SAN BERNARDINO COUNTY, CALIFORNIA, Geological Survey, Menlo Park, CA. Water Resources Div.

For primary bibliographic entry see Field 5B. W79-02663

PRELIMINARY HYDROLOGIC BUDGET OF THE SAND-AND-GRAVEL AQUIFER UNDER UNSTRESSED CONDITIONS, WITH A SEC-TION ON WATER-QUALITY MONITORING, PENSACOLA, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-

sources Div. For primary bibliographic entry see Field 5B. W79-02664

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977-VOLUME 2. RED RIVER BASIN.

Geological Survey, Oklahoma City, OK. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02665

WATER RESOURCES DATA FOR ARKANSAS, WATER YEAR 1977.

Geological Survey, Little Rock, AR. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02666

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977--VOLUME 1. ARKAN-SAS RIVER BASIN.

Geological Survey, Oklahoma City. OK. Water Resources Div.

For primary bibliographic entry see Field 7C. W79-02667

WATER RESOURCES DATA FOR WEST VIR-GINIA. WATER YEAR 1977.

Geological Survey, Charleston, WV. Water Resources Div.

For primary bibliographic entry see Field 7C. W79-02668

N15/N14 RATIOS OF GROUND-WATER NITRATE, LONG ISLAND, NEW YORK,

Texas Univ. at Austin. Bureau of Economic Geol-

For primary bibliographic entry see Field 5B. W79-02689

LAS VEGAS VALLEY WATER BUDGET: RE-LATIONSHIP OF DISTRIBUTION, CON-SUMPTIVE USE, AND RECHARGE TO SHAL-LOW GROUNDWATER,

Nevada Univ. System, Las Vegas. Desert Re-For primary bibliographic entry see Field 5G.

NICOMEKL-SERPENTINE BASIN STUDY, BRITISH COLUMBIA, Department of Fisheries and Environment, Van-

couver (British Columbia). Water Resources Branch.

W79_02728

Scientific Series No. 94, 1978, 36 p, 24 fig, 3 maps, 9 ref. 4 tah

Descriptors: *Artesian wells, *Watersheds(Basins), *Groundwater, *Irrigation, *Movement, Methodology, Investigations, Climatology, Hydrology, Geology, Chlorides, Chemical analysis, Stratigraphy, Bedrock, Glaciology, *Canada, *Nicomekl-Serpentine drainage basin(B C), *British Columbia

The Nicomekl-Serpentine drainage basin covers an area of 322 sq. km. (124 sq mi) of which 57 sq km (22 sq mi) are lowlands below elevations of 1 m (3 ft). The lowlands occupy a former embayment of the sea that is filled with more than 300 m (1000 ft) of unconsolidated Quaternary deposits. All of the wells drilled within the lowlands are flowing arteries but the statement of the sian, but the geology does not indicate a classical artesian basin. The groundwater movement within the drainage basin has been defined using geochemistry. Local flow systems that occur in the upland areas become integrated into major flow systems, the discharge end of which occupies the lowlands. The high total dissolved solids and hy-drochemistry of the groundwater within the low-lands suggest that groundwater movement is con-trolled in part by (1) flow reversals caused by semidiurnal tidal fluctuations; (2) decreased per-meabilities owing to facies changes inherent in the meabilities owing to facies changes inherent in the sediments that were deposited in a fluvial, glacio-fluvial and glaciomarine environment; and (3) flow restrictions caused by the confluence of regional flow systems. Since a relatively high NaCl concentration is characteristic of the quality of much of the groundwater, a map showing isochlors, or lines of equal chloride concentrations, is included in this report as well as a classification using sodium criteria as a guide to illustrate the suitability of the erroundwater for irrigation. (WATDOC) groundwater for irrigation. (WATDOC) W79-02785

USE OF NEUTRON ACTIVATABLE TRACERS FOR SIMULATING WATER AND CHEMICAL FLOW THROUGH POROUS MEDIA, Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering. For primary bibliographic entry see Field 5B. W79-02814

INTERACTION BETWEEN LANDFILL LEA-CHATES AND CARBONATE-DERIVED RESID-UAL SOILS, Missouri Univ.-Columbia. Dept. of Geology. For primary bibliographic entry see Field 5B. W79-02829

A THREE-DIMENSIONAL GALERKIN FINITE ELEMENT MODEL FOR THE ANALYSIS OF CONTAMINANT TRANSPORT IN VARIABLY SATURATED POROUS MEDIA.

Waterloo Univ. (Ontario). Dept. of Earth Sciences. For primary bibliographic entry see Field 5B. W79-02838

UNCERTAINTIES OF KARSTIC WATER RE-SOURCES SYSTEMS, Arizona Univ., Tucson. Dept. of Systems and In-dustrial Engineering. For primary bibliographic entry see Field 2F. W79-02883

THE EFFECT OF ORGANIC CARBON ON THE CONCENTRATIONS OF IRON AND HYDROGEN SULFIDE IN GROUND WATER, Missouri Univ.-Columbia. Dept. of Geology. For primary bibliographic entry see Field 5A. W79-02908

WELL FIELD SITE SELECTION BASED ON GEOLOGIC CRITERIA THAT INFLUENCE GROUND WATER CIRCULATION IN THE VICINITY OF LARAMIE, WYOMING, Wyoming Univ., Laramie. Water Resources Researc.. Inst. D. A. Lundy, and P. W. Huntoon. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 546, Price codes: A07 in paper copy, A01 in microfiche. Project Completion Report, September 1978. 76 p., 9 fig. 9 tab, 23 ref, 4 append. OWRT A-024-WYO(1), 14-34-0001-7108,8054.

Descriptors: *Groundwater, Hydraulics, *Wyo-ming, Groundwater movement, Geohydrology, Potable water, Dissolved solids, Calcium, Magne-sium, Bicarbonates, *Sites(Water wells), *Casper aquifer(Wyo), Laramie(Wyo).

The Casper aquifer is defined as the saturated part of the Casper and Fountain formations in the vicinity of Laramie, Wyoming. Faults provide lateral and vertical zones of large transmissivity, and are hydraulic drains that collect westward-flowing ground water and shunt it to springs near the Casper-Satanka contact. Recharge to the aquifer over a 79 sq. mi. intake area is estimated to be 1.4 inches/year. The Casper aquifer contains potable water that has a total dissolved solids range of 139 to 285 milligrams/liter. The chemical character of to 285 milligrams/liter. The chemical character of Casper water is calcium-bicarbonate in elevated parts of the recharge area but becomes a calcium-agnesium-bicarbonate water down-grandient.

AN APPRAISAL OF THE HYDROGEOLOGICAL PROCESSES INVOLVED IN SHALLOW SUBSURFACE RADIOACTIVE WASTE MANAGEMENT IN CANADIAN TERRAIN, Department of Fisheries and Environment, Ottawa (Ontario). Water Resources Branch.

For primary bibliographic entry see Field 5B. W79-02926

DUG-WELLS, DUG-CUM-BORE WELLS, AND TUBEWELLS.

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Denver, CO \$25. Open-, 1 fig, 1 tab.

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4B-Groundwater Management

Central Groundwater Board, Nagpur (India). P. G. Adyalkar. Indian Farming, p 13-16, March, 1975.

Descriptors: *Dug wells, *Water wells, *Water supply, *Shallow wells, *Water yield, Water sources, Groundwater, Groundwater mining, Water table, Well data, Permeability, Wells, Hydrogeology, Boreholes, Soil texture. Recharge, Soil types, Aquifers, Surveys, Water resources, Dug-cum-bore wells, *Tubewells, *India.

For optimum potential, dug wells should have a large diameter, adequate water column, high per-meability and low hydraulic gradient. In non-arid regions their depth is limited to 60 m, and in Maharashtra and Madhya Pradesh in India, the dug-wells are generally limited to 20 m. A water column of about 5 m in the lean part of the year column of about 5 m in the lean part of the year should be adequate. There is good reason to put a bore in an existing well (dug-cum-bore wells) when: (1) the formation tapped in the open well is fine-grained or poor in productivity, and there is a good chance of encountering a coarse-grained or productive formation below a depth of 15 m; (2) productive formation below a depth of 15 m; (2) the formation tapped in the open well is limited in depth but underlain by an effective confining bed followed in depth by a good confined aquifer; or (3) the potential productive water table zone is tapped fully in the existing due well by improvement in respect to increased depth, diameter and water column. A tubewell taps a potential confined aquifer below a confining layer and therefore ef-fectiveness of the tubewell will depend upon the effectiveness of the confining bed. (Robinett-Arizona) W79-02994

DEVELOPMENT CAVITY TYPE OF TUBEWELLS,

Indian Inst. of Tech., Kharagpur.
For primary bibliographic entry see Field 8B. W79-03000

4C. Effects On Water Of Man's Non-Water Activities

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF NUTRIENTS, A RAINFALL SIMU-LATION STUDY,

Iowa Natural Resources Council, Des Moines S. G. Barisas, J. L. Baker, H. P. Johnson, and J. M.

Transactions of the American Society of Agricultural Engineers, Vol. 21, No. 5, p 893-897, September-October 1978. 6 fig, 1 tab, 23 ref.

Descriptors: *Soil erosion, *Runoff, *Nutrients,
*Farm management, Soil conservation, Crops,
Company State of the Company of t Corn, Mulching, Rainfall, Simulated rainfall, Soils, Soil types, Sediments, Phosphorus, Nitrogen, Nitrates, Ammonia, Phosphates, Water pollution, Agriculture, *Tillage practices, Residue cover.

The objective of this study was to evaluate the effects of different tillage practices on the loss of N and P in runoff and sediment from experimental plots using simulated rainfall. Twelve plots on each piots using simulated rainfail. I weive piots on each of 3 different Iowa soils were planted to corn, and 6 tillage practices were used. Simulated rainfall was applied to the plots, and surface runoff samples were collected. The water fraction of the runoff was analyzed for NO3-N, NH4-N, and PO4-N, but confirmed was analyzed for NO3-N, NH4-N, and PO4-N, but confirmed was a serious properties. P; the sediment was analyzed for total nitrogen and available phosphorus. At all sites, the available content of the eroded soil increased with residue cover; however, decreased soil loss with increased residue cover offset the higher available P content of the eroded soil. Loss of total N with sediment was inversely related to the percentage of soil covered with residue. Losses of NO3-N, NH4-N, and PO4-P with water were small as compared with N and P losses with sediment. Soluble nutrient concentrations were positively correlated with the amounts of soil surface covered with residue. Conservation tillage practices are ineffective in reducing the loss of water soluble nutrients; how-

ever, they did reduce total nutrient loss by control-ling erosion. (Sims-ISWS) W79-02680

SPATIAL CHANGES IN WATERFOWL HABI-

Canadian Wildlife Service, Ottawa (Ontario). For primary bibliographic entry see Field 2H. W79-02742

HISTORICAL LAND USE CHANGES AND IMPACTS IN LAKE CHAMPLAIN WETLANDS (1941/42, 1962, 1974),

New England River Basins Commission, Burlington VT. Lake Champlain Basin Study.
E. Barber, D. J. Bogucki, G. K. Gruendling, and M. Madden. June, 1977. 80 p. 3 tab, 5 ref, 2 append.

Descriptors: *Wetlands, *Land use, *History, *Lake Champlain, Marshes, Lakes, Land development, Marsh management, Agriculture.

Historical trends in land use change and impacts were analyzed from the early 1940's through 1974 for land both in and adjacent to 12 selected or priority Lake Champlain areas. This has changed little except for a slight tendency towards abandonment of cultivated areas since 1939-42. Only a few places have been developed residentially or industrially to any extent, and these are all located in close proximity to urban areas. Wetlands with gentle slopes from the terrestrial to the wetland environment (primarily deltaic and bayhead) are apparently much more subject to man-related pressures. In addition, these wetlands are more prone to be state conservation agencies' sites of habitat modification for waterfowl management and recreational complexes. (Steiner-Mass)

ECOSYSTEMS OF THE WORLD 1: WET COASTAL ECOSYSTEMS.

For primary bibliographic entry see Field 2L.

SOCIAL IMPACTS FROM WILDLIFE WITHIN THE COLUMBIA BASIN IRRIGATION DIS-

Washington State Univ., Pullman. Dept. of Forest and Range Management For primary bibliographic entry see Field 6B.

4D. Watershed Protection

EVALUATION OF MEASURES FOR CONTROLLING SEDIMENT AND NUTRIENT LOSSES FROM IRRIGATED AREAS, Idaho Agricultural Experiment Station, Moscow. For primary bibliographic entry see Field 5G. W79-02501

AN OVERVIEW OF NUTRIENT CYCLING RE-SEARCH AT COWEETA HYDROLOGIC LABO-

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab.

C. D. Monk, D. A. Crossley, Jr., R. L. Todd, W. T. Swank, and J. B. Waide.

In: Watershed Research in Eastern North America: A workshop to compare results, February 28-March 3, 1977, Edgewater, Maryland, Chesapeake Bay Center for Environmental Studies, Smithsonian Institute, Tidemark Printing, Inc., Edgewater, Vol. I, p. 35-50. 1977 1 fig, 1 tab, 36 ref.

Descriptors: *Cycling nutrients, *Water budget sil-viculture, *Productivity, Coniferous forest, De-ciduous forest, *Southern Appalachian Mountains region, *North Carolina.

A research program at the Coweeta Hydrologic Laboratory, North Carolina, is investigating effects of perturbation or manipulations on nutrient cy-

cling and productivity of forested watersheds. The experimental approach is to explain whole ecosystem behavior, as revealed by watershed nutrient and water budgets, by reference to internal ecosystem processes. Research is designed to examine the emergence of higher level ecosystem properties from lower level component processes. This report describes the general scope of the research at process levels and relates dynamics of internal processes to ecosystem level response. The research is organized around a general theory of ecosystem relative stability, based on the complementary aspects of resistance to disturbance and resilience following disturbance. The research is a cooperative effort between the U. S. Forest Service and the University of Georgia. (Forest Service) W79-02571

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FOREST SERVICE STUDIES OF SOIL AND NUTRIENT LOSSES CAUSED BY ROADS, LOGGING, MECHANICAL SITE PREPARATION, AND PRESCRIBED BURNING IN THE SOUTHEAST,

Southeastern Forest Experiment Station, Franklin, NC. Coweets Hydrologic Lab. For primary bibliographic entry see Field 5B.

W79-02572

SIMULATION OF POTENTIAL EFFECTS OF FOREST UTILIZATION ON THE NITROGEN CYCLE IN DIFFERENT SOUTHEASTERN ECOSYSTEMS,

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab.

J. B. Waide, and W. T. Swank. J. B. Watte, and W. I. Swank.
In: Watershed Research in Eastern North America: A workshop to compare results, February 28-March 3, 1977, Edgewater, Maryland, Chesapeake Bay Center for Environmental Studies, Smithsonian Institute, Tidemark Printing, Inc., Edgewater, Vol. I, p. 767-789. 1977 5 fig, 2 tab, 19 ref.

Descriptors: *Nitrogen cycle, *Productivity silvi-culture, Forest practices, Coniferous trees, Decidu-ous trees, Southeastern ecosystems.

Research at the Coweeta Hydrologic Laboratory is examining effects of management practices on elemental cycles in forested watersheds. Forest elemental cycles in forested watersneds. Forest harvesting methods may alter both quality of streamwater draining forested lands (the off-site response) and sustainable productivity of forest being managed (the on-site response). Results from Cowecta suggest that long-term changes in water-quality are not likely to result from current management practices, but effects on sustainable yield are unknown. Simulation models of nitrogen cycling were used to assess potential effects of severcling were used to assess potential effects of several all management alternatives on sustainable produc-tivity and elemental cycling. Responses of nitrogen dynamics in oak-hickory and loblolly pine forest to simulated merchantable-stem and complete-tree har-vests with several rotation lengths were examined. vests with several rotation lengths were examined.

Results suggest that some management practices may lead to long-term alterations of nitrogen cycling and productivity, and that conclusions from such simulation studies will depend on how elemental cycling models are conceptualized. Discussions emphasize the importance of evaluating landmanagement alternatives in the context of current knowledge of forest elemental cycling processes.

(Forest Service)

NUTRIENT BUDGETS FOR UNDISTURBED AND MANIPULATED HARDWOOD FOREST ECOSYSTEMS IN THE MOUNTAINS OF NORTH CAROLINA,

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. W. T. Swank, and J. E. Douglass.

Mr. 1. Swans, and 3. E. Douglass.

In: Watershed Research in Eastern North America: A workshop to compare results, Feb 28-Mar 3, 1977. Edgewater, Maryland, Chesapeake Bay Center for Environmental Studies, Smithsonian Institute, Tidemark Printing, Inc., Edgewater, Vol. I, p 343-363. 1977 2 fig, 7 tab, 16 ref.

Identification Of Pollutants—Group 5A

Descriptors: *Forestry practices, *Water quality, Chemical properties, *Cycling nutrients, Silviculture, Coniferous forest, Deciduous forest, *Southern Appalachian Mountains, *North Carolina.

ern Appalachian Mountains, *North Carolina.

Stream chemistry was monitored for 8 mature hardwood ecosystems and 16 forested systems that were altered by cutting, species conversions, and changes in land use. Net budgets (input minus output) of NO3-N, NH4-N, PO4-P, Cl., K+, Na+, Ca++, Mg++, SO4=, and SiO2 were estimated for 15 ecosystems based on dissolved ion concentrations and the quantity of precipitation and streamflow. None of the manipulations produced long-term nutrient discharges that would adversely affect water quality for municipal or fishery use. Of the nutrients studied, NO3-N provided the most sensitive index of ecosystem disturbance. When the forests were cut and in various stages of revegetation, elevated NO3-N discharge was observed at least 13 years after cutting, but appeared to return to baseline levels 20 years after treatment. No changes in the discharge of NH4-N and PO4-P were observed for any of the water-shed; all ecosystems showed very large accumulations of SO4=. A grass-to-forest succession water-shed that had been fertilized, limed, and herbicided showed large nutrient losses. Conversion of deciduous forests to eastern white pine reduced the loss of most nutrients, and net budgets of young coppice forests indicated nutrient cycles that wer as closed or tight as mature hardwood forests. Results demonstrate the importance of both hydrologic and biologic processes in evaluating ecosystem response. (Forest Service)

PREIMPOUNDMENT STUDY LITTLE BLACK CREEK DRAINAGE BASN BLACK CREEK WA-TERSHED BULLOCH COUNTY, GEORGIA, Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div.

For primary bibliographic entry see Field 5C. W79-02635

TRANSPORT OF AGRICULTURAL CHEMICALS FROM SMALL UPLAND PIEDMONT WATERSHEDS, Environmental Research Lab., Athens, GA

For primary bibliographic entry see Field 5B. W79-02745

A MULTIOBJECTIVE APPROACH TO MANAGING A SOUTHERN ARIZONA WATER-SHED,

SHED,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
A. Goicoechea, L. Duckstein, and M. Fogel.
In: Hydrology and Water Resources in Arizona and the Southwest. Proceedings of the 1976 Meetand the Southwest. Proceedings of the 1976 Meetings of American Water Resources Assn. and Arizona Academy of Sciences, Tucson, Arizona, April 29-May 1 1976, p 233-242 (1976). OWRT B-043-ARIZ(10), 14-31-0001-5056.

Descriptors: Decision making, Natural resources, *Arizona, *Watershed management, *San Pedro River watershed(Ariz), Mathematical program-ming, *Multiobjective management.

The case study of an Upper San Pedro River watershed is developed to show how a multiple objective approach to decision-making may be used in watershed management. The effects of various land treatments and management practices on water runoff, sediment, recreation, wildlife levels, and commercial potential of a study area are investigated while observing constraints on availalevels, and commercial potential of a study area are investigated while observing constraints on available land and capital. The example involves the optimization of five objective functions subject to eighteen constraints. In an iterative manner, the decision-maker proceeds from one noninferior solutions to the contraints. decision-maker proceeds from one noninterior so-lution to another, comparing sets of land manage-ment activities for reaching specified goals, and evaluating trade-offs between individual objective functions. This technique, which involves the for-mulation of a surrogate objective function and the use of the cutting plane method to solve the gener-al nonlinear problem, hopefully provides a com-

promise between oversimplified and computationally intractable approaches to multiobjective watershed management.

5. WATER QUALITY MANAGEMENT AND PROTECTION

MICROBIAL DEGRADATION OF PESTI-

COPES,
Cornell Univ. Agricultural Experiment Station,
M. Alexander.

M. Alexander.
A vailable from the National Technical Information
Service, Springfield, VA 22161 as ADA-047 675,
Price codes: A08 in paper copy, A01 in microfiche.
Office of Naval Research, Department of the
Navy, Contract Numbers N00014-76-C-0019,
N00014-67-A-0077-0027, 159 p, 1977. 29 fig, 38 tab,

Descriptors: *DDT, *Microbial degradation, *Bacteria, *Fungi, *Metabolism, Biodegradation, *Pesticide residues, *Chlorinated hydrocarbon pesticides, *Pesticides, Chemical reactions, Pesticide kinetics, DDD, DDE, Organophosphorus pesticides, Chemical analysis, Enzymes, Organic compounds, Aquatic algae.

Microbial degradation of various organochlorine, organophosphorus and carbamate pesticides by aquatic and soil microorganisms was studied. Bacteria, fungi, and an alga (Cylindrospermum sp. metabolized DDT to water-soluble products. 1,1-dichloro-2,2-bis(P-chlorophenyl)ethylene, DDD, DDB, DDM, DBH, DBP and PCPA were detected. The degradation of DDT inetabolites yielded: DDM, DBH and DBP from DDA; DBH and DBP from DDM and its breakdown products had no significant effect on respiration of microbial communities or algal productivity. The biodegradability of DDT analogs was related to their chemical structure. Studies of resting-cell suspensions and cell-free enzyme exresting-cell suspensions and cell-free enzyme exresting-cell suspensions and cell-free enzyme extracts of two organophosphate-and one carbamate-utilizing bacteria indicated that both constitutive and induced broad, substrate-specific enzymes were responsible for organophosphate and carbamate metabolism. The metabolites of various organophosphates were: dimethyl and diethyl phosphate and thiophosphate, indicating hydrolytic attack on the parent compound by phosphatases. (EIS-Deal) W79-02583

5A. Identification Of Pollutants

EVALUATION OF THE MC.300A SOIL MOISTURE METER TO DETERMINE IN-PLACE MOISTURE CONTENT OF REFUSE AT LAND DISPOSAL SITES, Environmental Protection Agency, Cincinnati, OH. Solid Waste Management Office.

R. J. Wigh.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 359, Price codes: A02 in paper copy, A01 in microfiche. Progress Report No. SWR-91, 1971. 24 p, 2 fig, 1 tab. 8 ref. 1 append.

Descriptors: *Soil moisture meter, *Landfills, *Degradation, *Moisture content, Solid waste disposal, Waste dumps, Liquid wastes, Sludge, Solid wastes, Moisture meters, Laboratory tests, Testing procedures, Wastes, Municipal wastes.

Preliminary results of a laboratory investigation of the portable soil moisture meter, MC-300A, to determine the in-place moisture content of refuse at land disposal sites are presented. Several samples of fresh and composted refuse with varying moisture contents were prepared, moisture probes were inserted into the samples, meter readings were obtained, and calibration curves were drawn relating the moisture content to the meter readings. ing the moisture content to the meter readings. The discrepancies noted during the investigation

indicated that the instrument was less accurate than first assumed, so that its usefulness is limited to noting changes in moisture rather than specific changes in moisture content. This instrument could be useful for studying movement of moisture be useful for studying movement of moisture ronts, but not for the correlation of moisture content and gas production or temperature. The instrument is further limited by the changing moisture properties due to decomposition, and data obtained should be considered qualitative rather than quantitative. (Davison-IPA)

DETECTION OF WATER POLLUTANTS BY LASER EXCITED RESONANCE RAMAN SPECTROSCOPY; PESTICIDES AND FUNGI-

CIDES, Rhode Island Univ., Kingston. Dept. of Chemistry. R. J. Thibeau, L. Van Haverbeke, and C. W.

Rhode Island University Marine Reprint No. 100. Reprinted from: Applied Spectroscopy, Vol 32, No 1, p 98-100, 1978. 4 fig. 1 tab, 8 ref. SG-04-6-158-44002.

Descriptors: *Pollutant identification, *Pesticides, *Fungicides, *Spectroscopy, Water pollution, Pes-ticide residues, Pollutant detection.

The feasibility of resonance Raman spectroscopy in the detection of hazardous chemicals in water has been tested on some nitrophenol-based pesti-cides and fungicides. In most cases, detection limits below the parts per million level were obtained. The method was also tested on an artifically pollut-ed river water sample. (NOAA) W79-02576

INVESTIGATION OF ISOTHIOCYANATOPENTAAQUOCHROMIUM (IID AS A REAGENT FOR THE SEPARATION AND IDENTIFICATION OF NANOGRAM QUANTITIES OF MERCURY (I), MERCURY (II), AND METHYLMERCURY (II),

North Dakota Univ., Grand Forks. Dept. of

Chemistry.

R. J. Baltisberger, and C. L. Knudson.

Analytical Chemistry, Vol. 47, No. 8, p 1402-1406,

July 1975, 1 fig. 5 tab. 22 ref. OWRT B-020
NDAK(3), 14-31-0001-3922.

Descriptors: Analytical techniques, Water analysis, *Mercury, Separation techniques, *Pollutant identification, *Methylmercury, Isothiocyanatopentaaquochromium(III), Mercury complexes, Identification, Separation of mercury

The reagent, isothiocyanatopentaaquochromium (III) (CrNCS2+), forms polynuclear species with CH3Hg+, Hg2+, and Hg22+ with the stoichiometry (CrNCS)nMex+ where n equals 1 or 2. An metry (CrNCs)Mex+ where n equals 1 or 2. An ion exchange procedure was investigated for the separation of nanogram quantities of Me equal to Ch3Hg+, Hg22+, and Hg2+ in water based on the formation of the (CrNCS)nMe complex ions. The three mercury species can be isolated by variation of the eluent acidity. Possible analytical applications for samples containing down to 20 nanograms of mercury are discussed.

W79-02589

A BIOMONITORING PROCEDURE UTILIZING NEGATIVE PHOTOAXIS OF FIRST INSTAR AEDES AEGYPTI LARVAE,

Virginia Polytechnic Inst. and State Univ., Blacks-

D. E. Simonet, W. I. Knausenberger, L. H. Townsend, Jr., and E. C. Turner, Jr. Archives of Environmental Contamination and Toxicology, Vol. 7, p 339-347, 1978. 3 fig, 2 tab, 33 ref. OWRT A-042-VA(3).

Descriptors: *Toxicity, *Water quality monitoring, Heavy metals, Pesticides, Mosquitoes, *Monitoring, Larvae, Aquatic insects, Toxicity tests, Pollutant identification, *Biomonitoring, Phototaxis, Water pollution control.

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STURBED FOREST n, Franklin,

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Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5A-Identification Of Pollutants

This research addresses the need for an assessment of field conditions and in-plant effluent toxicity in water-quality management efforts. It develops a sensitive, easily performed test which does not require elaborate facilities or great expense of time or money. It evaluates the toxic effect of selected heavy metals and insecticides on mosquito larvae (Aedes aegypti) by using inhibition of swimming ability to indicate poisoning of the central nervous system. The research describes a photomigration procedure, which differs from standard acute mortality tests, and uses an inexpensive multi-unit apparatus consisting of four glass troughs perpendicular to a uniform light source. Inhibition of larval ability to swim away from light was used as the parameter for determining toxicity. The toxicants tested were the heavy metals copper, cadmium, and hexavalent chromium; and the pesticides carbofuran, methomyl, fenitrothion, fonofos, and phosmet. Results showed that, of the metals, cadmium was most toxic, followed by copper and then chromium. Of the insecticides evaluated, fenitrothion, fonofos, and phosmet were most toxic. The ion, fonofos, and phosmet were most toxic. The procedure described represents a sensitive means of assessing water quality rapidly and economically. W79-02593

EFFECT OF MERCURY ON NADH AND THE PROTECTIVE ROLE OF OXALACETATE. Georgia Univ., Athens. Dept. of Food Science. For primary bibliographic entry see Field 5D. W79-02596

CATHODIC STRIPPING METHODS FOR THE DETERMINATION OF PHOSPHATE AND AR-SENATE IN NATURAL WATERS,

Southern Illinois Univ. at Carbondale C. Kuo-hsien

C. Kuo-nsien.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 382, Price codes: A08 in paper copy, A01 in microficher PhD Dissertation, December 1977. 137 p. 37 fig. 10 tab, 83 ref. OWRT A-087-ILL(5), and S-033-ILL(1).

Descriptors: Chemical analysis, Electrochemistry, *Phosphates, *Water analysis, *Arsenate, Ion selective membranes, Trace analysis(Inorganic), Pollutant identification, *Cathodic stripping method.

The oxidation of Fe(II) at a carbon electrode in the The oxidation of Fe(II) at a carbon electrode in the presence of phosphate and/or arsenate results in a film of Fe(III) salts of those anions on the electrode surface. Accumulation of the film under controlled conditions occurs in direct proportion to the concentrations of those anions. Subsequent electrochemical reduction of the salt film provides a current which can readily be related to the original solution concentration. In this manner original solution concentration. In this manner phosphate and arsenate can be determined down to 10 micrograms per liter (ppb). Natural water contains several species which can interfere with this method. Hence, a simple pretreatment method which utilizes Donnan dialysis (transfer through an which utilizes Donnan dialysis (transfer through an anion exchange membrane) was developed for studies on such samples. The resulting approach, Donnan dialysis followed by electrochemical striping analysis, provides statistically identical results to those obtained by use of standard methods for the determination of phosphate and arsenate in water and wastewater. Test samples included lake water, river water, and sewage effluent from several sources. The method is processing the statement of the standard of the standard several sources. al sources. The method is more rapid, more sensitive, and less subject to interference. W79-02602

EXPERIMENTS WITH LITTORINA SPECIES TO DETERMINE THE RELEVANCY OF OIL

TO DETERMINE THE RELEVANCY OF OIL
SPILL DATA FROM SOUTHERN CALIFORNIA TO THE GULF OF ALASKA,
University of Southern California, Los Angeles.
Inst. for Marine and Coastal Studies.
For primary bibliographic entry see Field 5C.

DESIGN AND EVALUATION OF LABORATORY ECOLOGICAL SYSTEM STUDIES,

Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife. For primary bibliographic entry see Field 5C. W79-02625

FEASIBILITY OF USING BACTERIAL STRAINS (MUTAGENESIS) TO TEST FOR ENVIRONMENTAL CARCINOGENS, Houston Univ., TX. Dept. of Biology. For primary bibliographic entry see Field 5C.

W79.02626

TECHNIQUES FOR SAMPLING AND ANALYZING THE MARINE MACROBENTHOS. Corvallis Environmental Research Lab., OR.

R. C. Swartz. R. C. Swartz. Available from the National Technical Information Service, Springfield, VA 22161 as PB-281 631, Price codes: A03 in paper copy, A01 in microfiche. Report EOA-600/3-78-030, 34 p. March 1978. 2

Descriptors: "Sampling, "Analytical techniques, "Biological communities, "Benthic fauna, Mathematical studies, Aquatic populations, Data collections, On-site data collections, Monitoring, Testing procedures, Bottom sampling, Water analysis, Chemical analysis, Biomass, "Methodology, "Species diversity, "Tissue analysis.

This report presents guidelines for the quantitative assessment of the effects of marine pollution on benthic community structure and population dynamics. The sampling design addresses the number and location of stations, survey frequency, sampling gear, replication of samples, screening and preservation of biological samples, and the collection of abiotic data. Recommendations are given for the sortine identification, enumeration and tion of ablotic data. Recommendations are given for the sorting, identification, enumeration, and weighing of benthic specimens. The section on data analysis suggests indices for detecting changes in species composition, density, dispersion, diversity, richness, dominance, spatial-temporal faunal homogeneity. (EIS-Deal) W79.02627

DETERMINATION OF ALKYLMERCURY COMPOUNDS IN LAKE SEDIMENTS BY STEAM DISTILLATION-FLAMELESS ATOMIC ABSORPTION.

Purdue Univ., Lafayette. Dept. of Agronomy. M. Floyd, and L. E. Sommers.
Analytical Letters Vol 8 No 8, p. 525-535, 1975. 3 tab, 10 ref. OWRT A-023-IND(3).

Descriptors: *Mercury, *Lake sediments, Water pollution, Gas chromatography, *Pollutant identification, *Alkymercury compounds, Methylmercury, Dimethylmercury, Steam distillation, Atomic

Organic mercury compounds in lake sediments were separated into dialkyl- and monoalkylmercury fractions by steam distillation and subsequently quantified by flameless atomic absorption. The method recovered nearly all CH3HgCh3 and Ch3HgCl added to diverse sediments. Parameters influencing the efficacy of the procedure, i.e., Hg concentration, sample size and distillation time, were evaluated.
W79-02642 W79-02642

USE OF COMMENSAL PROTOZOA AS BIO-LOGICAL INDICATORS OF WATER QUALITY

AND POLLUTION,
Wayne State Univ., Detroit, MI. Dept. of Biology.
For primary bibliographic entry see Field 5C. W79-02643

GROUNDWATER IN THE NEWBERG AREA, NORTHERN WILLAMETTE VALLEY, OREGON

Survey, Portland, OR. Water Re-Geological

For primary bibliographic entry see Field 2F. W79-02650

BACTERIOLOGICAL WATER QUALITY OF TULPEHOCKEN CREEK BASIN, BERKS AND LEBANON COUNTIES, PENNSYLVANIA, Geological Survey, Harrisburg, PA. Water Re-sources Div. For primary bibliographic entry see Field 5B. W79-02654

DISTRIBUTION OF DISSOLVED NITRATE AND FLUORIDE IN GROUND WATER, HIGH-LAND-EAST HIGHLANDS, SAN BERNAR-DINO COUNTY, CALIFORNIA, Geological Survey, Menlo Park, CA. Water Resources Div.

For primary bibliographic entry see Field 5B. W79-02663

PRELIMINARY HYDROLOGIC BUDGET OF THE SAND-AND-GRAVEL AQUIFER UNDER UNSTRESSED CONDITIONS, WITH A SEC-TION ON WATER-QUALITY MONITORING, PENSACOLA, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-sources Div.

For primary bibliographic entry see Field 5B. W79-02664

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977--VOLUME 2, RED RIVER BASIN.

Geological Survey, Oklahoma City, OK. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02665

WATER RESOURCES DATA FOR ARKANSAS, WATER YEAR 1977. Geological Survey, Little Rock, AR. Water Resources Div. For primary bibliographic entry see Field 7C. W79-02666

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977-VOLUME 1. ARKAN-SAS RIVER BASIN. Geological Survey, Oklahoma City. OK. Water

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Resources Div. For primary bibliographic entry see Field 7C. W79-02667

WATER RESOURCES DATA FOR WEST VIR-GINIA, WATER YEAR 1977. Geological Survey, Charleston, WV. Water Re-

sources Div For primary bibliographic entry see Field 7C. W79-02668

VOLATILE CHLORO- AND BROMOCARBONS IN COASTAL WATERS, Maryland Univ., College Park, Dept. of Chemis-

For primary bibliographic entry see Field 5B. W79-02684

A DEVICE TO COLLECT SUPERNATANT WATER FROM MEASUREMENT OF THE FLUX OF DISSOLVED COMPOUNDS ACROSS SEDIMENT SURFACES,

Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.

B. T. Hargrave, and G. F. Connolly.

Limnology and Oceanography, Vol. 23, No. 5, p 1005-1010, September 1978. 4 fig, 1 tab, 14 ref.

Descriptors: *Sampling, *Water chemistry, *Instrumentation, *Equipment, Sediments, Dissolved oxygen, Carbon dioxide, Phosphorus, Bottom sediments, Chemical analysis, Analytical techniques, Data processing, Supernatant water, Sediment surfaces.

Identification Of Pollutants-Group 5A

A bell jar chamber with a clock-driven release mechanism was designed to collect samples of water trapped over undisturbed sediments. Sam-ples taken at 3-h intervals over 24 h were analyzed for dissolved oxygen, carbon dioxide, and total phosphorus, and in situ flux across the subtidal sediment surface was calculated. (Sims-ISWS)

TRACE METALS IN THE WATERS OF A PAR-TIALLY MIXED ESTUARY, Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab. For primary bibliographic entry see Field 2K. W79-02687

N15/N14 RATIOS OF GROUND-WATER NI-TRATE, LONG ISLAND, NEW YORK, Texas Univ. at Austin. Bureau of Economic Geol-

ogy. For primary bibliographic entry see Field 5B. W79-02689

LAKE PROCESS MODELS APPLIED TO RES-ERVOIR MANAGEMENT, URS Corp., San Mateo, CA. W. L. Bradford, and D. J. Maiero.

W. L. Bradford, and D. J. Malero.

Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol 104, No. EE5, p 981-996, October 1978. 3 fg, 8 tab, 22 ref.

Descriptors: *Lakes, *Reservoirs, *Management, *New York, *New Jersey, *Pennsylvania, *Trophic level, *Model studies, Eutrophication, Loading, Impoundment, Phosphorus, Predictions, Dissolved oxygen, Mesotrophy, Equations, Simulation analysis, Systems analysis.

Two simplified models of lake processes have been used to predict the trophic state of the proposed Tocks Island Lake to be constructed on the Delaware River, north of Trenton, New Jersey. Using independent estimates of phosphorus entering the lake area via the river, both models predicted that the lake would be eutrophic with hypolimnetic dissolved oxygen demands exceeding 5 mg/l and midsummer Secchi Disk transparency depths as low as 0.6 m. Point source phosphorus loads to the basin were estimated from known wastewater discharges and nonpoint loads from known wastewater discharges and nonpoint loads from known wastewater discharges and nonpoint loads from known land uses basin were estimated from known wastewater discharges, and nonpoint loads from known land uses and area loading factors. Then proposed measures to reduce the phosphorus load were tested for effectiveness by calculating the proportional decrease in load brought about by each measure and applying the proportion to the phosphorus load entering the lake area. The new load was then used with the models to predict the new trophic state. It was found that very stringent controls would be required to bring a significant change in the trophic state toward mesotrophy. (Bell-Cornell) W79-02716

NON-POINT SOURCE WATER QUALITY MONITORING, INYO NATIONAL FOREST,

California Univ., Los Angeles. Environmental Sci-

Cantorna Univ., Los Angeles. Environmental Science and Engineering.

A Progress Report, Contribution No. 156, California Water Resources Center, University of California, Davis, March 1976. 138 p, 69 fig. 82 ref, append. Bass, J., Westerdahl, F.D., and Perrine,

Descriptors: *Water quality, *Monitoring, *National forests, *California, *Non-point sources, Recreation areas, Wilderness areas, Evaluation, Sampling, Natural environment, Human use, Physical measurements, Chemical analyses, Bacteriological observations.

Presented are the results of a study focused on the impact of non-point sources on water quality in wilderness and recreational areas within the Inyo National Forest in California. One objective was to asses water quality with regard to physical, chemi-cal and bacteriological parameters in a manner permitting evaluation of area-wide sources. A

second objective, as an ongoing part of the Center's studies, was to develop improved test methods for continuing water quality monitoring and protection in such areas. Concern was given to increasing understanding of relationships between water quality, the natural environment and human use. The principal effort in these studies involved a monitoring program in which 34 sites selected by the U.S. Forest Service were sampled one or more times during the summer and fall, 1975. (Most sites can be characterized as high altitude, alpine lakes of small to moderate size, or streams, snow-fed from granite basins). All sites represented areas frequented by recreational visitors, and were sampled with their use as a primary concern. Physical measurements included air and water temperature, dissolved oxygen, pH, and total dissolved solids. Chemical analysis included tests for sulfates, nitrate-nitrogen, Kjeldahl nitrogen, chloride, phosphates, total phosphorus and methylene blue active substances. Bacteriological observations included total and fecal coliform organisms and Yersinia enterocolitica. Additional sampling concerned algae in a portion of the lakes studied. A separale research effort by means of laboratory-scale experimental investigation looked into the means of transport of bacteria from sites at which they might be deposited to a nearby water body. (Bell-Cornell) W79-02718

ENVIRONMENTAL PARAMETERS OF THE TENNESSEE RIVER IN ALABAMA: II. PHYSI-CAL, CHEMICAL, AND BIOLOGICAL PA-CAL, CHEM

Alabama Univ., in Huntsville. School of Graduate Studies and Research.

L. M. Rosing. UAH Research Report No. 173, June 1976. 283 p, 163 fig, 16 tab, 17 ref, 3 append. NASA NASS-

Descriptors: *Alabama, *Tennessee River, *Water quality, *Sampling, *On-site investigations, Data processing, Chemical properties, Biological properties, Physical properties, Chemicals, Hardness(Water), Metal, Water temperature, Fish, Turtles, Benthic fauna, Pollutants, Monitoring, Rivers, Water pollution.

Physical, chemical, and biological data from 5 sites in the Tennessee River, 2 in Guntersville Reservoir and 3 in Wheeler Reservoir, Alabama, were corre-lated with climatological data for 3 annual cycles. lated with climatological data for 3 annual cycles. Two of the annual cycles were for the years prior to the Browns Ferry Nuclear Power Plant operations, and one was for the first 14 months of Plant operations, and one was for the first 14 months of Plant operations, and comparison of the results of the annual cycles indicated two distinct physical conditions in the reservoirs, one during the warm months when the reservoirs are at capacity and one during the colder winter months when the reservoirs have been drawndown for water storage during the rainy months and for weed control. The wide variations of physical and chemical parameters to which the biological organisms are subjected on an annual basis control the biological organisms and their population levels. Comparison of the parameters of the site below the powerplant indicated that the heated effluent from the plant operating with 2 of the 3 reactors has not had any effect on the organisms at this site. Recommendaating with 2 of the 3 reactors has not had any effect on the organisms at this site. Recommendations included the development of prediction math models for the physical and chemical parameters under specific climatological conditions which affect biological organisms. Recommendations also included continuing the weekly sampling at the Wheeler and Browns Ferry site to determine the long-range effect of the Browns Ferry Nuclear Power Plant. (Sims-ISWS) W79-02781

DETOXIFICATION OF METALS BY MARINE BIVALVES: AN ULTRASTRUCTURAL STUDY OF THE COMPARTMENTATION OF COPPER AND ZINC IN THE OYSTER OSTREA EDULIS, Institute of Marine Biochemistry, Aberdeen (Scot-

S. G. George, B. J. S. Pirie, A. R. Cheyne, T. L. Coombs, and P. T. Grant.

Marine Biology, Vol. 45, p 147-156, 1978. 3 fig. 4

Descriptors: "Metals, "Copper, "Zinc, "Oysters, "Toxicity, "Electron microscopy, "Biological membranes, "Enzymes, "Animal metabolism, Cytological studies, Path of pollutants, Molluaks, Pathology, Animal physiology, "Detoxification, Vesicles, "Tissue analysis, "Bioaccumulation.

An investigation of the mechanisms of detoxifica-tion of copper and zinc by the oyster has been carried out using naturally occurring 'green-sick' (contaminated by copper) and unpolluted oysters. Electron microprobe x-ray analysis of tissues in the electron microscope gives direct evidence for the structural compartmentation of copper and zinc in separate, specific, granular amoebocytes. The metals are immobilized in membrane-limited vesimetals are immobilized in membrane-limited vesicles as different chemical compounds, copper being associated with sulphur and zinc with phosphorus. Chemical analysis of serum and tissues of normal and 'green-sick' oysters indicate that (1) Cu and Zn are accumulated independently, (2) the Cu and Zn in the serum, while higher than in the surrounding sea water, are maintained at a 10-fold smaller level than the tissues, (3) toxicity is reduced by active uptake from the serum into granular amoebocytes, where it is further reduced by compartmentation in membrane-limited vesicles. It is calculated that the individual cell types may contain as much as 13,000 ppm Cu and 25,000 ppm Zn. (EIS-Deal) w79-02784 W79-02784

APPLICABILITY OF EXISTING METHODS FOR THE DETERMINATION OF THE BIO-CHEMICAL OXYGEN DEMAND (BOD) OF IN-CINERATOR QUENCH WATER,
Bureau of Solid Waste Management, Cincinnati,

Available from the National Technical Information Service, Springfield, VA 22161 as PB-236 946, Price codes: A03 in paper copy, A01 in microfiche. 1970, 41 p, 4 fig, 9 tab, 11 ref, 1 append. EPA-RS-

Descriptors: *Water pollution, *Biochemical oxygen demand, *Water analysis, *Dissolved oxygen analyzers, Laboratory equipment, Sampling, Measurement, Liquid wastes, Incinerators, Water pollution sources, Pollutant identification, Bioindicators, Bioassay, Microorganisms, Winkler test, Quenching, Analytical techniques, Alsterberg(Azide), Modifications, Cooling water.

An investigation of the Alsterberg (Azide) modifi-cation of the Winkler (Dissolved Oxygen) method and the Weston and Stack (DO) Analyzer, model 300-B, to assess their applicability in determining the Biochemical Oxygen Demand (BOD) of incin-300-B, to assess their applicability in determining the Biochemical Oxygen Demand (BOD) of incinerator quench water is discussed. The interfering substances found were many of the same ones found in samples of lakes, rivers, streams, sewage and industrial waste waters, but they were in lower concentrations. It was found that quench water samples had BOD values ranging from 100 to 300 ppm on a 5-day basis. These samples required a dilution factor to 2.5%, and it is suggested that the analyst use more samples to reduce possible errors in the BOD result. Modification of existing methods was unnecessary, but immediate DO analysis or the seeding technique are not recommended. It is concluded that properly interpreted BOD measurements can serve as an index to water quality. The Alsterberg (Azide) modification of the Winkler method was unsatisfactory for determining BOD measurements on the samples of quench water that were tested. The Weston and Stack Do Analyzer, model 300-B, analyzed the BOD content of the quench water samples successfully. A detailed method for the application of this instrument was written, which includes a newly developed procedure for an easy, fast field calibration check on a properly calibrated DO analyzer. Qualitative tests to determine the applicability of the modified Wenkler method on field samples are included. (Davison-IPA) (Davison-IPA)

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Group 5A-Identification Of Pollutants

EVALUATION OF PROPOSED NPDES LIMITATIONS FOR HOMESTAKE MINING COMPANY AND LEAD-DEADWOOD SANITARY DISTRICT NO. 1.

Inforcement Investigations Center, Denver. CO.

For primary bibliographic entry see Field 5G. W79-02790

TASTE AND ODOR, MISSOURI RIVER, IOWATRIBUTARIES AREA, IOWA-NEBRASKA,

Environmental Protection Agency, Kansas City, MO. Region VII.

For primary bibliographic entry see Field 5G. W79-02811

DENITRIFICATION IN A MASSACHUSETTS SALT MARSH, Boston Univ., MA. Dept. of Biology.

. Kaplan.

PhD Dissertation, 1977. 78 p.

Descriptors: *Salt marshes, *Massachusetts, *Denitrification, Wetlands, Coastal marshes, Tida marshes, Marsh plants, Aquatic bacteria, Cyanophyta, Nitrates, Ammonia, Nitrogen cycle Tidal cycle.

The rate of gaseous nitrogen flux from salt marsh sediments during denitrification was studied using fertilized plots. In all plots, rates of denitrification increased 2 to 3 fold during the summer. There was also fertilized-induced increases in denitrificawas also fertilized-induced increases in dentiffica-tion, particularly in sediments of low marsh Spar-tina alterniflora. Rates of denitrification ranged from 1.5 g N/sq m/year for control plots to 3.8 N/sq m/year for fertilized plots. Rates of denitrifi-cation in various habitats of the marsh (tidal creek bottoms, panes, high marsh) also increased during the summer months. The most striking increases occurred between sediments of creek bank and high marsh S. alterniflora. Groundwater discharge from surrounding fresh water springs contained high concentrations of nitrate and could be a major source of oxidized nitrogen compounds used in denitrification. The total annual amount of N lost denitrification. The total annual amount of N lost during denitrification was equal to the annual NO3(-) and NO2(-)-N input by groundwater. The potential of marsh sediments to generate nitrate during the oxidation of NH4(+) to NO3(-) was quite high, but these rates will only be realized at depths where oxygen is able to diffuse into the mud from Spartina roots. Under most circumstances, nitrate was rapidly removed from these anoxic sediments. (Steiner-Mass) W79-02812

ANALYSIS AND CHARACTERIZATION OF TRACE ELEMENTS IN SHALE OIL PROD-UCTS BY INSTRUMENTAL NEUTRON ACTI-VATION ANALYSIS,

Missouri Univ.-Columbia. Dept. of Chemistry.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 421, Price codes: A06 in paper copy, A01 in microfiche, MA Thesis, December 1978. 109 p, 12 fig, 21 tab, 71 ref. OWRT A-106-MO(1), 14-34-0001-8027.

Descriptors: *Instrumental neutron activation analysis, *Trace elements, *Shale oil products, *Oil shale, Water pollution, Heavy metals, Arsenic, *Pollutant identification, Missouri, Green River(MO), Aluminum, Antimony, Bromine, Cerium, Chlorine, Chromium, Cobalt, Copper, Gallium, Gold, Iodine, Iron, Manganese, Mercury, Molybdenum, Potassium, Selenium, Sodium, Sulfur, Tungsten, Vanadium, Zinc.

Trace elements and their mobilization constitute an important consideration in the development of new fossil fuel technologies. Shale oil produced by in situ retorting of soil shale is an alternative fossil energy source. This study deals with the analysis of trace elements in various shale oil products using instrumental neutron activation analysis (INAA). INAA offers several advantages for those elements for which it is applicable. The greatest

advantage is the lack of sample preparation prior to analysis, which greatly simplifies the process and prevents sample contamination. The elements for which analyses are reported in this study are for which analyses are reported in this study are aluminum, antomony, arsenic, bromine, cerium, chlorine, chromium, cobalt, copper, gallium, gold, iodine, iron, manganese, mercury, molybdenum, potassium, selenium, sodium, sulfur, tungsten, va-nadium, and zinc. W79-02822

INTERACTION BETWEEN LANDFILL LEA-CHATES AND CARBONATE-DERIVED RESID-UAL SOILS,

Missouri Univ.-Columbia. Dept. of Geology For primary bibliographic entry see Field 5B. W79-02829

LONG-TERM ASPECTS OF THE ENVIRON-MENTAL BURDEN FROM ENERGY PRODUC-TION: CO2 AND 3H, (IN GERMAN),

Kernforschungsanlage Juelich G.m.b.H. (West Germany). Programmgruppe Systemforschung und Technologische Entwicklung.

Report Jul-1165, February 1975. 171 p, 69 fig, 12 tab. 149 ref.

Descriptors: *Powerplants, *Air pollution, *Pol-lutants, *Water cycle, Carbon dioxide, Tritium, Water pollution, Water pollution sources, Model studies, Mathematical models, Electric power, Electric power industry, Electric powerplants, Thermal powerplants, Nuclear powerplants, Energy, Foreign research, Atmosphere, Fossil powerplants.

The subjects of this study were the carbon dioxide and tritium emissions from fossil or nuclear power plants. The analysis of possible effects of alternative strategies to meet future energy demand on the temperature of the atmosphere depends on the mathematical model of the global carbon dioxide cycle whin uses nonlinear differential equations. As there have to be substitutions of fossil power plants by the processor for the carbon dioxide the control of the carbon discount of As there have to be substitutions of fossil power plants by nuclear facilities, another model was constructed to simulate the water cycle of the northern and southern hemispheres. The model makes it possible to compute the effects of tritium emissions in the future. (Sims-ISWS) W79-02855

USE OF HISTOLOGIC AND HISTOCHEMI-CAL ASSESSMENTS IN THE PROGNOSIS OF THE EFFECTS OF AQUATIC POLLUTANTS, Louisville Univ., KY. School of Medicine.

For primary bibliographic entry see Field 5C. W79-02877

TRACE METALS IN SOME FISH SPECIES OF SOUTH CAROLINA

South Carolina State Coll., Orangeburg. Dept. of A. K. Koli, S. S. Sandhu, W. T. Canty, K. L. Flex, and R. J. Reed.

Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 328-331, 1978. 1 tab, 5 ref.

Descriptors: *Metals, *Fish physiology, Animal metabolism, *Copper, *Iron, *Zinc, Manganese, *Cadmium, *Mercury, Brown trout, Shrimp, White bass, Catfishes, Freshwater fish, Marine fish, Fish behavior, *Tissue analysis.

Samples of fish from freshwater and saltwater sources of ocean, rivers, and lakes over the state of South Carolina were collected. The fish collected were Shrimp, Silver Snapper, White Bass, Catfish, Mudfish, and Trout. Triplicate samples of fish muscle tissue were analyzed by wet digestion and dry digestion methods. A significant finding of this report is that saltwater fish have more trace metal levels than freshwater fish, and larger fish have higher trace metal levels than smaller fish. Iron and zinc levels were much higher in Shrimp than any other species analyzed. (EIS-Deal) W79-02887 Samples of fish from freshwater and saltwater

CADMIUM AND ZINC CONTENT OF FISH FROM AN INDUSTRIALLY CONTAMINATED LAKE.

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B. R. Murphy, G. J. Atchison, A. W. MacIntosh. and D. J. Kolar. and D. J. Kolar. Journal of Fish Biology, Vol. 13, p 327-335, 1978. 2

Descriptors: *Cadmium, *Zinc, *Sunfishes, *Bass, Industrial wastes, Metals, Fish physiology, Animal metabolism, Chemical wastes, Fish populations, Lakes, Effluents, Path of pollutants, Trophic levels, Size, Spectrophotometry, Chemical analysis, Indiana, *Bioaccumulation, *Tissue analysis, Palestine Lake.

Eleven species of fish from an industrially-con-taminated lake were analyzed for whole body cadtaminated lake were analyzed for whole body can mium and zinc content by atomic absorption spec-trophotometry. Cadmium and zinc content of fish were species related, and most species accumulated these trace metals to levels significantly higher than background. Cadmium content was much more variable than zinc content. Distributions of more variable than zinc content. Distributions of concentrations of both cadmium and zinc in fish were lognormal, and concentrations of both metals tended to decrease in higher trophic levels. Zinc concentrations significantly decreased as total length increased in three species. (EIS-Deal) W79-02888

RAPID METHOD FOR DETERMINING CON CENTRATIONS OF BAYER 73 IN WATER DURING LAMPRICIDE TREATMENTS. Fish and Wildlife Service, La Crosse, WI. Fish Control Labs.

V. K. Dawson, P. D. Harman, D. P. Schultz, and J. L. Allen. Journal of the Fisheries Research Board of Canada, Vol. 35, p 1262-1265, 1978. 2 fig. 7 ref.

Descriptors: *Lampreys, *Pesticides, *Chemical analysis, *Pollutant identification, Pesticide residues, Chemical properties, Water analysis, Laboratory tests, Testing procedures, Analytical techniques, Great Lakes, Water chemistry, *Lampricides, Bayer 73, *TFM.

Two, simple, rapid, sensitive methods were developed for determining the concentration of the lampricide Bayer 73 in stream water. Bayer 73 was extracted from acidified water samples with chloroform and then hydrolyzed to CNA with either acid or base. The CNA was diazotized with sodium nitrite, and an azo dye was formed with either N-(1-naphthyl) ethylenediamine dihydrochloride (after acid hydrolysis) or 1-naphthol (after base hydrolysis). (EIS-Deal)
W79-02891

CHLORINATED PESTICIDES AND HEAVY METALS IN STREAMS AND LAKES OF NORTHERN MISSISSIPPI WATER,

Rust Coll., Holly Springs, MS. For primary bibliographic entry see Field 5B. W79-02900

APPLICATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY TO THE STUDY OF DISSOLVED ORGANIC PHOS-PHORUS COMPOUNDS RELEASED BY ALGAE.

Tennessee Univ., Knoxville. Dept. of Civil Engi-

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 493, Price codes: A05 in paper copy, A01 in microfiche. MS Thesis 74 p. 23 fig. 13 tab, 39 ref. OWRT A-035-TENN(1).

Descriptors: *Chromatography, *Algae, *Phosphates, Analytical techniques, *Dissolved organic phosphorus, *Pollutant identification.

An analytical technique utilizing high performance liquid chromatography (HPLC) for separating the

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WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Identification Of Pollutants-Group 5A

inositol phosphates was studied. Commercial inositol hexaphosphate (IHP) and inositol monophosphate (IMP) were adequately separated on Aminex A-27 resin with ammonium bicarbonate as the eluent. A breakdown of the organic bound phosphorus to orthophosphate occurred while on the HPLC column. This breakdown procedure could be due to an alkaline hydrolysis process. Chromatograms of solutions initially containing only IHP yielded four peaks which appear to be best ascribed to residual IHP and the intermediate inositol phosphates containing 5, 4, and 2 phosphates groups per molecule. IMP was not an intermediate of IHP hydrolysis on the LC column. Dissolved organic phosphorus compounds released by the culture Chlamydomonas reinhardtii were subjected to preliminary separation on Sephadex G-25. Sephadex G-25 fraction, which was equal to the inositol phosphate elution position, was chromatographed on the HPLC and resulted in only the orthophosphate peak being identified. This HPLC chromatogram showed that a clean-up procedure was needed prior to HPLC separation. Alkaline bromination was chosen since all the non-inositol phosphates would be oxidized. Samples from the culture study were subjected to alkaline bromination and then chromatographed on sephadex G-25 before being placed on the HPLC. The results showed three major peaks which did not match any of the inositol phosphate standards. Alkaline bromination followed by re-chromatographing the Sephadex fractions resulted in one peak at the elution position of IMP, thus providing marginal evidence for the presence of this compound in the culture solution. W79-02906

CHROMATOGRAPHIC STUDIES OF DIS-SOLVED ORGANIC PHOSPHORUS COM-POUNDS RESULTING FROM ALGAL CUL-TURES,

Tennessee Univ., Knoxville. Dept. of Civil Engi-

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Descriptors: *Chromatography, *Algae, *Phosphorus, Compounds, Orthophosphates, *Dissolved organic phosphorus, *Pollutant identification.

organic phosphorus, *Pollutant identification.

Each of the four algae studied released significant amounts of dissolved organic phosphorus (DOP) into the surrounding water. In some instances the amount of DOP exceeds the amount of dissolved inorganic phosphorus (DIP) in the culture system. The DOP produced is a complex mixture of compounds as shown by the number of peaks on some Sephadex profiles and the large number of spots on the thin layer chromatography (TLC) plates of algal samples. The fact that 16 non-DIP peaks appear on the Sephadex profile of this sample, reinforces the conclusion that each peak in a Sephadex profile can be composed of many different compounds. The number of compounds comprising the DOP increases with culture age and then levels off as the culture leaves the log-growth phase and then starts declining in a closed system such as was used in this study. TLC studies of unfractionated algal culture samples indicate that some of the same compounds are released by each of the four algal species. Some of the DOP compounds persist for several weeks in the culture media. These compounds may either by resistant to degradation and/or reutilization by the algae or they may be continually taken up and replaced by further release by the algae. If the first reason is true, the persistent compounds could possibly be metabolic end-products which are relatively refractory. Even if this is so, they may be readily utilizable by other algal species or by bacteria. IMP is one of the compounds which appear to be present in the DOP produced by all four algal species it also seems to persist in the DOP for several weeks. IHP does not appear to be present in the DOP produced by the four algae at any time during the culture growth periods examined.

THE EFFECT OF ORGANIC CARBON ON THE CONCENTRATIONS OF IRON AND HYDROGEN SULFIDE IN GROUND WATER, Missouri Univ.-Columbia, Dept. of Geology.

Missouri Univ.-Columbia. Dept. of Geology.

R. N. Stoufer.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 555, Price codes: A05 in paper copy, A01 in microfiche.

M. A. thesis December 1975. 85 p, 18 fig. 10 tab, 54 ref, append. OWRT B-077-MO(3), 14-31-0001-2609.

Descriptors: Groundwater, *Iron, *Organic carbon, *Sulfides, Microorganisms, *Oxidation-reduction potential, *Missouri, Water supply, Water wells, *Sulfur-reducing bacteria, Ions, Sampling, Dissolved solids, Water pollution.

Dissolved solids, Water pollution.

Twenty water supply wells in northern Missouri were sampled to determine the relationships between dissolved organic carbon and microorganisms on iron and sulfide concentrations in unpolluted ground water. The concentrations of ferrous iron, sulfide, organic carbon, major ions and the pH and Eh were determined on each water sample. Organic carbon and dissolved ferrous iron were readily measureable in samples. Organic carbon was generally present at low levels (2 mg/9). Even though thee was no evidence of coliform or streptococcus microorganisms none of the water samples was sterile. Two to six genera of non-pathogenic bacteria were present in each sample, the majority being nitrate reducers. Sulfate-reducing bacteria were detected in half of the samples. The data suggest that there is a poor correlation between the redox potential and dissolved organic carbon content of the rocks appears to be a more important factor in controlling the redox potential of ground water. The data for nitrate-ammonia and sulfate-sulfide indicate that many of the water samples were not in internal equilibrium with respect to oxidation-reduction reactions. (Carpenter-Missouri)

ADSORPTION, MOBILITY AND DEGRADA-TION OF CYANAZINE AND DIURON IN SOILS, Nebraska Univ., Lincoln. Dept. of Agronomy. For primary bibliographic entry see Field 5B. W79-02909

ATRAZINE PERSISTENCE IN A VALENTINE LOAMY FINE SAND PROFILE.

raska Univ., Lincoln. Dept. of Agronomy. R H Hammon

R. H. Hammons.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 492, Price codes: A04 in paper copy, A01 in microfiche. MS Thesis, May 1977. 48 p. 1 fig. 17 tab, 42 ref. OWRT B-030-NEB(4), 14-34-0001-5087.

Descriptors: Water quality, *Herbicides, Irrigation, *Atrazine, *Loam, Soil profiles, Sands, Pesticide residues, Path of pollutants, Water pollution.

The persistence data indicate that atrazine dissipation in irrigated Valentine loamy fine sand occurs at a rate greatly exceeding that expected for this soil texture. Atrazine is rapidly degraded in the top 6 inches of soil and mobility data show that the major portion of surface applied atrazine remains in this layer. Atrazine losses by volatilization seemed to occur most prevalently within 1 or 2 days after the initial application. These losses appear to be very dependent on soil moisture and soil temperature. Conversion of atrazine to hydroxytarizine by photodecomposition or hydroxylation soil temperature. Conversion of atrazine to hydroxyatrazine by photodecomposition or hydroxylation did not seem to cause a major portion of the dissipation of atrazine. The low amount of hydroxyatrazine formation may be related to the fact that this soil has a low exchangeable hydrogen, clay and organic matter content. Therefore, this conversion would not occur readily. The primary factor of atrazine dissipation in these studies has not been clearly shown. The addition of water enhances this dissipation, possibly by increasing or atimulating the microbial population of the soil, or by influencing chemical conversion of atrazine to

forms other than hydroxyatrazine. Therefore, in irrigated sandy soils, it appears that contamination of soil or groundwater is not a major problem when recommended rates of atrazine are used. W79-02910

AN INEXPENSIVE AND EASILY FABRICATED SAMPLER FOR COLECTING SEDIMENT CORES TO MEASURE EH POTENTIALS, University of West Floida, pensacola. Faculty of For primary bibliographic entry see Field 7B. W79-02917

CHEMICAL ANALYSIS OF MINE DRAINAGE

CHEMICAL ANALYSIS OF MINE DRAINAGE WATERS,
Colorado School of Mines, Golden. Dept. of Chemistry; and Colorado School of Mines, Golden. Dept. of Geochemistry.
T. R. Wildeman, A. J. Wildeman, and R. Ramirez.
In: Molybdenum in Environment, Vol. 2, W. R. Chappell and K. K. Petersen eds., Marcel Dekker Inc., p. 739-751, 1977.

Descriptors: *Pollutant identification, Water pollution, Mine drainage, Water quality, Water chemistry, *Chemical analysis, *Iron, *Sulfates, Analytical techniques, *Colorado(Front range).

A scheme is described for the analysis of the constituents in mine drainage waters, with particu-lar attention being paid to the problems that the high iron and sulfate concentrations might cause in standard analytical methods. Iron, manganese, standard analytical methods. Iron, manganese, zinc, copper, sodium, potassium, magnesium, cadmium, and lead can be accurately analyzed in mine drainages using direct analysis by atomic absorption specrometry. However, the matrix can interfere in the analysis of calcium and methods for eliminating the interference using different chelating agents met with only limited success. The analysis of trace amounts of copper, lead, and cadmium in mine drainage by anodic stripping voltammetry appears to be a promising alternate method when solvent extraction cannot be used. W79-02918

CHEMICAL LIMNOLOGY OF THE NORTH CHANNEL, 1974, Department of Fisheries and Environment, Bur-

lington (Ontario). Water Quality Branch.
N. D. Warry.
Scientific Series No. 92, 1978, 12 p., 4 fig., 8 ref., 4

Descriptors: Limnology, *Water chemistry, *Chemical analysis, *Water quality, *Trace elements, Seasonal, Sampling, Data collections, Parametric hydrology, *Canada, Lake Huron, Georgian Bay, *North Channel, *St. Mary's River, *Water exchange.

Analysis of North Channel water collected on seven surveys between April and December 1974 permitted a comprehensive chemical definition of this water body. Using these data, it was possible to define three distinct areas of water in the North Channel. It also was found that the chemical quality of the North Channel is determined mostly by the water quality of the St. Marys River. An estimate of water exchange between the North Channel and Lake Huron was calculated using the chemical data. It indicated that 17% of the total Channel and Lake Fluron was calculated using fine chemical data. It indicated that 17% of the total volume of the North Channel may be exchanged during a one-year period. The North Channel is small enough that man's impact on the water chemistry can be seen. This is best demonstrated by its elevated ammonia concentrations. Soluble by its elevate animona concentrations. Solution trace metal concentrations exhibit a seasonal variation in the North Channel, very similar to that observed in Georgian Bay. (WATDOC) W79-02921

CHEMICAL LIMNOLOGY OF GEORGIAN

BAY, 1974,
Department of Fisheries and Environment, Burlington (Ontario). Water Quality Branch.
N. D. Warry.

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Group 5A-Identification Of Pollutants

Scientific Series No. 91, 1978, 13 p, 6 fig. 19 ref. 4

Descriptors: Limnology, *Nutrients, *Chemicals, *Silicates, *Ions, Alkalinity, Variability, Surface waters, Trace elements, Watersheds(Basins), Epilimnion, Hypolimnion, Data collections, *Canada, *Georgian Bay, *Lake Huron.

Seven complete chemical surveys of Georgian Bay were conducted between April 28 and December 6, 1974. The observed distributions and open water concentrations of seven major ions (Ca, Mg, Na, K, Cl, SO42, alkalinity), six trace metals (Cu, Ni, Fe, Pb, Mn, Zn), and six nutrients (total P, dissolved reactive P, total dissolved P, NO3 + NO2, NH3 and reactive silicate) are presented. Comment on the probable causes of the observed concentrations and their distribution patterns has been included. In addition, the overall chemical composition of Georgia Bay is discussed in terms of its controlling variables. In order of importance these are (1) exchange with Lake Huron, (2) lithology of the drainage basin, (3) the effect of the Frech River, (4) exchange with North Channel and (5) human activity in the drainage basin. (WATDOC) W79-02923

THE DETECTION OF HEIGHTENED SEA-WATER COPPER CONCENTRATIONS BY THE MUSSEL MYTILUS EDULISI, Natural Environment Research Council, Bangor

(Wales). Marine Invertebrate Biology Unit.

J. Davenport, and A. Manley. J. Davenport, and A. Mantey.

Journal of the Marine Biological Association of the
United Kingdom, Vol. 58(4) 1978; p 843-850, 3 tab,

Descriptors: *Metals, *Copper, Bioassay, Toxicity, Mortality, *Mussels, Molluscs, Animal behaviour, *Laboratory tests, Animal physiology, Water pollution effects, Methodology, Laboratory equipment, *Behavioral reactions, Mytilus edulis.

An acute toxicity threshold of 0.09-0.10 ppm added copper was determined for specimens of Mytilus edulis from the Menai Strait which were exposed to copper (as CuSO4)in a flowing sea-water system. Results are presented which show that the closure response of the mussel to added copper is a three-part process. First, a sharp adduction of the shell valves is seen at a mean total copper concentration of only 0.021 ppm, then as the copper concentration rises, 'testing' behaviour is observed and finally the shell valves close to isolate the animal from its environment. The complete valve closure mechanism only operates at added copper concentrations of 0.2 ppm or more. The initial behavioural reaction of valve adduction at low concentration occurred at a significantly higher occavioural reaction of valve adduction at low concentration occurred at a significantly higher mean total copper concentration (0.16 ppm) in mussels which had been previously acclimated to 0.02 ppm total copper in sea water for 10 days. (EIS-Katz) W79-02960

PLANT COMPETITION FOR ATRAZINE, Nebraska Univ., Lincoln. Dept. of Agronomy. D. W. Hoffman.

D. W. Hoffman. Available from the National Technical Information Service, Sprinfield, VA 22161 as PB-291 556, Price codes: A04 in paper copy, A01 in microfiche. Ph.D. Dissertation, December 1976. 49 p, 6 fig. 18 tab, 21 ref. OWRT B-030-NEB(3), 14-34-0001-5087.

Descriptors: *Herbicides, *Atrazine, *Bioassay, Pesticide residues, Soil analysis, Plant population, Oats, Sovbeans.

Greenhouse plant bioassays were initiated to study the effects of plant competition for herbicide residues present in soil. Oats and soybeans were grown in studies to determine the effects of plant population on bioassay sensitivity. Improved bioassay sensitivity to trace levels of atrazine was found by decreasing the symplect of plants are not obtained. decreasing the number of plants per pot. Optimum sensitivity observed on 450 g of Sharpsburg silty clay loam was at 0.06 ppmw atrazine using five oat plants per pot. The lowest detectable atrazine concentration using soybeans was 0.1 ppmw when 1 or 2 plants were grown per 450 g Keith silty loam. At high plant populations, a loss of sensitivity occurred. However, when higher atrazine concentrations were present in soil, increased plant populations allowed these high levels to be quantitatively measured. A 14C-labeled atrazine study showed that by increasing plant populations from 1 to 6 per pot, atrazine uptake was decreased 50% on a per plant basis. This indicated that plants within the pot were competing for the available atrazine. W79-02985

5B. Sources Of Pollution

THE CONTAMINATION OF GROUNDWATER BY HEAVY METALS FROM THE LAND DISPOSAL OF FLY ASH,

Notre Dame Univ., IN. Dept. of Civil Engineer-

T. L. Theis, and J. J. Marley.

T. L. Theis, and J. J. Marley.

Report No. TID-27019, December 1975. 7 p, 2 fig, 2 tab. E-(11-1)-2727.

Descriptors: *Water quality control, *Water pollution sources, *Heavy metals, *Groundwater, Mercury, Cadmium, Zinc, Fly ash, Adsorption, Soil chemical properties, Acidity, Alkalinity, Air pollution effects, Sorption, Desorption, Hydrogen ion

The continuing investigation of heavy metal sorp-tion onto various soils is reported. Emphasis is on the effect of environmental variables in ground-water on the adsorption of heavy metals. An illus-tration of the effect of pH for cadmium and zinc tration of the effect of pH for cadmium and zinc isotherms show variations suggesting that neutral pH's favor formation of hydroxides, and in doing so, enhance sorption onto soil particle surfaces. Ash type and solution pH influence the desorption of metals from ash particles, and it is concluded that the greater the adsorption tendency of a given metal onto the soil particles, the less its tendency to desorb from the ash. Results of the investigation of descendence of the source of the to desorb from the ash. Results of the investigation of mercury release from fly ash show that most ashes released very little mercury over the one day test period, however, several showed that the released mercury was in the elemental form. This mercury is volatile and could disappear from fly ash disposal sites before entering the groundwater environment. The total amount of mercury released for fly ash no. 6 was less than 1% of the total amount contained in the ash. (Davison-IPA) W79.07507 W79-02507

IDENTIFICATION AND INITIAL EVALUA-TION OF IRRIGATION RETURN FLOW TION OF MODELS.

Irrigation Hydrology Co., Fort Collins, CO. For primary bibliographic entry see Field 6A. W79-02510

A REPORT ON THE CONCENTRATION, DISTRIBUTION AND IMPACT OF CERTAIN TRACE METALS FROM SEWAGE TREATMENT PLANS ON THE CHESAPEAKE BAY, Chesapeake Research Consortium, Inc., Annapolis,

R. J. Huggett, O. P. Brucker, G. R. Helz, and S. E.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 735, Price codes: A02 in paper copy, A01 in microfiche. Report No. NSF-RA-E-74-030, CRC No. 31, Virginia Institute of Marine Science Contribution No. 628, June 1974. 19 p, 2 fig, 5 ref. GI-38973.

Descriptors: *Sewage treatment, *Chesapeake Bay, *Trace metals, *Shellfish, Ecosystems, Biota, Effluents, Design criteria, Toxins, Water pollution, Sediments, Sediment rates, Deposition, Sediment vield, Sewage treatment plant sites, Water pollution sources, Oysters, Cadmium, Copper, Chromition sources, Oysters, Cadmium, Copper, Chromition sources, Oysters, Cadmium, Copper, Chromitions ources, Oysters, Cadmium, Copper, Chromition, Chr

Preliminary findings of research directed towards ascertaining the impact of metals from sewage treatment plants on the Chesapeake Bay ecosys-

tem, and towards defining the physical-chemical-biological dynamic of these metals once in the estuarine environment are summarized. Metals in sewage and receiving waters, sewage metals in bottom sediments, and sewage metal uptake by oysters are discussed. Trace metals are now entering the Chesapeake Bay from sewage treatment plants in quantities which rival nature. It is recommended that inputs of the potentially toxic metals, cadmium, copper, chromium, lead and zinc, be considered in the design and siting of sewage treatment plants on the Chesapeake Bay. Processes for removing these metals from sewage should be incorporated into treatment designs for plants constructed near production shellfish beds, because accumulations of these metals in the shellfish may render them unusable by man. (Davison-IPA)

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CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES, UNITED STATES STEEL CORPORATION, IRVIN PLANT, PITTSBURGH, PENNSYLVANIA, AUGUST 18-28, 1975.

AUGUST 18-28, 1975.

National Enforcement Investigations Center, Denver, CO.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 588, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-330/2-75/012, December 1975. 73 p, 5 fig, 9 tab, 7 ref, 4 ap.

Descriptors: *Industrial wastes, *Steel plants, *Monogahela River, *Water quality, Effluents, Water pollution, Organic compounds, Oil, Water pollution sources, Outfall sewers, Monitoring, Onsite investigations, Waste water treatment, Neutralization, United States Steel Corporation, Coagulation, Filtration, Oil wastes, Domestic wastes, Penneyheais, Organic compounds. sylvania, Organic compounds.

United States Corporation's (USSC) Irvin Plant, primarily a steel finishing operation, uses an estimated maximum of 70 mgd of process water from the Monogahela River. Waste water is discharged to the river from two permit discharge points designated as 005 and 006. Waste water treatment facilities located at this plant consist of acid neutralization, treatment, waste oil treatment, and do designated as 005 and 006. Waste water treatment facilities located at this plant consist of acid neutralization treatment, waste oil treatment, and domestic waste water treatment. Waste oil treatment effluent is discharged through outfall 005 and domestic effluent through outfall 006. Acid neutralization wastes are transported by railroad tank car to an approved dump for disposal. Waste water discharges from outfalls 005, 006, 106, 306 and 406 were monitored; raw and treated water from the Monogahela were sampled to ascertain the net pollutant concentrations discharged; influent and effluent from the oil waste treatment system was sampled; and flow was measured and pollutant loads calculated for each outfall excepting the oily waste treatment system. During the National Enforcement Investigations Center (NEIC) monitoring period, flows ranged from 13.5 to 18.9 mgd; company self-monitored data was reported at 6.6 to 12.5 mgd. USSC proposed effluent limitations for total suspended solids, oil, grease and dissolved iron are compared with the survey data. Monitoring results and requirements for all outfalls are examined. (Davison-IPA)

DETERMINATION OF THE PRACTICAL VALUE OF TOXIC LOADINGS,

British Columbia Research Council, Vancouver. For primary bibliographic entry see Field 5C. W79-02536

AN OVERVIEW OF NUTRIENT CYCLING RE-SEARCH AT COWEETA HYDROLOGIC LABO-RATORY.

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab.
For primary bibliographic entry see Field 4D. W79-02571

FOREST SERVICE STUDIES OF SOIL AND NUTRIENT LOSSES CAUSED BY ROADS,

Sources Of Pollution-Group 5B

LOGGING, MECHANICAL SITE PREPARA-TION, AND PRESCRIBED BURNING IN THE SOUTHEAST,

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SOUTHEAST,
Southeastern Forest Experiment Station, Franklin,
NC. Coweeta Hydrologic Lab.
J. E. Douglass, and L. W. Swift, Jr.
In: Watershed Research in Eastern North America: A workshop to compare results, February 28March 3, 1977, Edgewater, Maryland, Chesapeake
Bay Center for Environmental Studies, Smithsonian Institute, Tidemark Printing, Inc., Edgewater,
Vol. II, p. 489-503. 1977 8 fig. 11 ref.

Descriptors: *Forest management, *Water quality, Chemical properties, *Stream pollution, Road construction, Road design, Reforestation, Sheet erosion, Turbidity, *Piedmont, *Southern Appalachian Mountains, North Carolina, South Carolina.

Soil and nutrient pollution of streams caused by woods roads, log skidding, mechanical site preparation, and prescribed burning are being studied in the Piedmont and Appalachian Mountains of the Carolinas. Stormflow from disturbed areas is measured by 1-foot H-flumes. Proportional samples for sediment and nutrient analysis are collected by 2-foot Coshocton wheels. Objectives of nonpoint source pollution studies are to establish baseline levels of soil and nutrient loss, determine increases in losses due to certain forestry practices, and develop methods of estimating losses for other practices and other locations. (Forest Service) W79-02572

SIMULATION OF POTENTIAL EFFECTS OF FOREST UTILIZATION ON THE NITROGEN CYCLE IN DIFFERENT SOUTHEASTERN ECOSYSTEMS,

Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. For primary bibliographic entry see Field 4D. W79-0257

NUTRIENT BUDGETS FOR UNDISTURBED AND MANIPULATED HARDWOOD FOREST ECOSYSTEMS IN THE MOUNTAINS OF NORTH CAROLINA, Southeastern Forest Experiment Station, Franklin, NC. Coweeta Hydrologic Lab. For primary bibliographic entry see Field 4D. W79-02574

WATER QUALITY ASSESSMENT MODEL - OXYGEN DYNAMICS MODEL FOR LOW-FLOW STREAMS, Civil and Environmental Engineering Development Office, Tyndall AFB, FL.

S. P. Shelton.
Available from the National Technical Information
Service, Springfield, VA 22161 as ADA-045 463,
Price codes: A03 in paper copy, A01 in microfiche.
Air Force Systems Command, Report CEEDOTR-77-15, March, 1977, NTIS, 27 p, 23 ref.

Descriptors: *Mathematical models, *Water quality, *Oxygen, Mathematical studies, *Streams, Stream flow, Biochemical oxygen demand, Water pollution effects, *Waste assimilative capacity, Waste dilution, Waste water disposal, Oxygen demand, Oxygen requirements, Oxygenation, Low-flow nitrogen compounds.

This investigation was undertaken to develop a low-flow stream waste assimilation model to determine the effect of point source discharges at selected Air Force installations. The impetus for this study was the lack of available low-flow stream models and the AF need to evaluate low-flow streams that traverse their installations. From data streams that traverse their installations. From data acquired by this and previous investigations, an analysis of oxygen sinks and sources, unique in their level of significance for low-flow streams, was undertaken. Oxygen sources and sinks considered were carbonaceous BOD, nitrogenous BOD, stream reoxygenation, benthic oxygen demand, and photosynthesis/respiration. In addition to these, the effects of toxic pollutants upon biological reaction rates and waste assimilative capacity were also explored. Techniques employed in this investigation may be considered as one approach to determine waste assimilation capacity and to simulate variations in the oxygen profile caused by point source wastewater discharges into a low flow stream. The validity and limitations of the overall approach, the ability to extrapolate oxygen profiles, and the ability to transpose conditions to facilitate prediction of future conditions is, at this time, not fully substantiated; however, positive indications have been obtained in model verification that lend credence to the procedures adopted. Future studies should be directed toward validation and improvement of the proposed model and sensitivity analysis to define confidence intervals. (EIS-Katz) W79-02579

CONCENTRATIONS OF TEN HEAVY METALS IN SOME SELECTED LAKE POWELL GAME FISHES,

New Mexico Univ., Alburguerque. Dept. of Biol-

ogy.

R. E. Bussey, D. E. Kidd, and L. D. Potter.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-273 026,
Price codes: A05 in paper copy, A01 in microfiche.

Lake Powell Research Project Bulletin No 34, J.

M. Varady, Ed., 72 p, November 1976, 9 tab, 13
fig, 37 ref.

Descriptors: *Metals, *Freshwater fishes, *Iron, Arsenic compounds, *Cadmium, Calcium, *Chromium, *Copper, *Lead, *Magnesium, *Selenium, *Zinc, Public health, Path of pollutants, Water pollution effects, New Mexico, Rainbow trout, Bass, *Lake Powell.

Ten tissue samples from each of four species of fishes--large-mouth bass, black crappie, walleye, and rainbow trout--from Lake Powell were analyzed and compared for the presence of concentrations of ten heavy metals: iron, calcium, magnesium, copper, chromium, cadmium, zinc, arsenic, selenium, and lead. Samples were digested with nitric and perchloric acids, and analyses were perfected nitric and perchloric acids, and analyses were performed by atomic absorption spectrophotometry. Concentrations were expressed on a dry-weight basis for all tissues and were not corrected for percent recovery. Since cadmium, lead, arsenic, and selenium are toxic to humans, the concentrations of these heavy metals in the edible portions of Lake Powell fishes were compared to the maximum safety threshold levels established in several independent studies. At this time, none of the metals, aside from selenium, appears in concentrations high enough to pose a health hazard and should not be cause for concern. However, the high selenium levels in fish flesh may constitute a possible health hazard, although little is known of the factors influencing selenium assimilation in humans. (EIS-Katz) humans. (EIS-Katz)

CONSEQUENCES OF LEACHING FROM PULP AND PAPER MILL LANDFILL OPERATIONS,

Econotech Services Ltd., New Westminster (British Columbia)

ISIN COLUMDIA: Canadian Forestry Service, Ottawa, Ontario K1A OH3, Cooperative Pollution Abatement Research (CPAR) Project Report 363-1, Progress Report to March 31, 1976, 176 p. 2 fig, 21 ref, 48 tab, 2

Descriptors: *Pulp wastes, *Solid wastes, *Landfills, *Leaching, Wastes, Industrial wastes, Waste disposal, Bark, Sludge, Fuels, Sawdust, Leachate, Hydrogen ion concentration, Metals, Ions, Biochemical oxygen demand, Color, Carbon, Methane, Hydrogen sulfide, Wood, Pulp and paper industry, Water pollution sources, Toxicity, Fish, Gases.

Nine paper-industry solid wastes (Douglas-fir bark, western red-cedar bark, biological sludge, several clarifier solids, salt water dredgings, and sawdush log fuel) were placed in specially designed lysimeters to determine the characteristics of leachates from a simulated 100-inch annual rainfall. Results showed considerable differences between leachates

from various sources. Depending on landfill material, leachates can have highly undesirable characteristics, such as low pH and high metal ion content, fish toxicity, total organic carbon, BOD, and color. Some materials evolve considerable quantities of methane and hydrogen sulfide. With some exceptions, most of the undesirable properties diminished considerably over the first year of study. Settling rates were determined for all materials. Certain soils were effective in removing many undesirable characteristics, but this limited experiment did not include measurement of soil capacity. Overall results clearly indicate that severe leachate problems may arise from landfill disposal of pulp and paper mill waste products or from storage of bark and wood; leachates from bark or wood can be equally undesirable. Biodegradability can vary considerably between leachates. Results of field studies were analyzed in the light of pilot-plant data. The worst material studied, particularly with respect to long-lasting adverse characteristics, was combined clarifier solids from a bleached kraft operation. (Brown-IPC)

ALTERNATIVE POLICIES FOR CONTROL-LING NONPOINT AGRICULTURAL SOURCES OF WATER POLLUTION, Illinois Univ. at Urbana-Champaign.

For primary bibliographic entry see Field 5G. W79-02619

BASELINE REPORT OF ENVIRONMENTAL CONDITIONS IN DEEPWATER DUMPSITE 106. VOL I: PHYSICAL CHARACTERISTICS. National Ocean Survey, Rockville, MD. For primary bibliographic entry see Field 5E. W79-02622

BASELINE REPORT OF ENVIRONMENTAL CONDITIONS IN DEEPWATER DUMPSITE 106. VOLUME II: BIOLOGICAL CHARACTER-

ISTICS.

National Ocean Survey, Rockville, MD.

For primary bibliographic entry see Field 5E.

W79-02623

BIOLOGICAL AVAILABILITY OF POLLUT-ANTS TO MARINE ORGANISMS,

Center for Energy and Environment Research, Mayaguez, Puerto Rico. For primary bibliographic entry see Field 5C. W79-02628

CHEMICAL AND BIOLOGICAL SURVEY OF LIBERTY BAY, WASHINGTON, Environmental Protection Agency, Seattle, WA. Surveillance and Analysis Div. For primary bibliographic entry see Field 5C. W79-02634

FATE OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN THE ENVIRONMENT: SUMMARY AND DECONTAMINATION REC-OMMENDATIONS,

Air Force Academy, CO. Dept. of Chemistry and Biological Sciences.

Biological Sciences.

A. L. Young, C. E. Thalken, E. L. Arnold, J. M. Cupello, and L. G. Cockerham.

Available from the National Technical Information Service, Springfield, VA 22161 as ADA-033 491, Price codes: A03 in paper copy, A01 in microfiche. Report USAFA-TR-76-18, 44 p. October 1976. 14

Descriptors: *Biodegradation, *Herbicides, *Pesticide kinetics, 2,4,5-T, Pesticides, Animal pathology, Path of pollutants, 2,4-D, Pesticide toxicity, Microbial degradation, Persistence, Chemical analysis, Organic compounds, Chlorinated hydrocarbon pesticides, *Bioaccumulation, *Tissue analysis, *Dioxin, *Agent orange, *TCDD.

Studies on the fate of 2.3.7.8-tetrachlorodibenzo-pdioxin (TCDD) have been conducted on biodegra-dation plots and field test areas that have received

ING RE-Franklin.

Field 4D.

IL AND ROADS,

Group 5B-Sources Of Pollution

massive quantities of Orange herbicide. From the studies reviewed in this report, it is apparent that (1) although TCDD may persist in the environment for long periods of time (greater than 12 years) when initially present in high concentrations on the soil surface, it may be degraded by soil microorganisms, especially when in the presence of other chlorinated hydrocarbons: (2) TCDD may accumulate in the tireus of roders captiles high other chlorinated hydrocarbons: (2) TCDD may accumulate in the tissues of rodents, reptiles, birds, fish, and insects when these organisms are exposed to TCDD contaminated soils (however, the levels of TCDD in the tissues apparently do not exceed the levels of TCDD found in the environment; and (3) rodents, reptiles, birds, fish and insects may tolerate, i.e., based on no observed deleterious effects in field studies, soil levels between 10-1,500 ppt TCDD. (EIS-Deal)
W79-02639

SELECTED HYDROLOGIC DATA, 1931-77, WASATCH PLATEAU-BOOK CLIFFS COAL-FIELDS AREA, UTAH,

Geological Survey, Salt Lake City, UT. Water Resources Div. For primary bibliographic entry see Field 7C.

W79-02645

HYDROLOGIC DATA FOR URBAN STORM RUNOFF FROM THREE LOCALITIES IN THE DENVER METROPOLITAN AREA, COLORA-

Geological Survey, Lakewood, CO. Water Resources Div

For primary bibliographic entry see Field 7C. W79-02646

IMPACT OF FLOW REGULATION AND POWER PLANT EFFLUENTS ON THE FLOW AND TEMPERATURE REGIMES OF THE CHATTAHOCHEE RIVER - ATLANTA TO WHITESBURG, GEORGIA,

Geological Survey, Doraville, GA. Water Resources Div

R. E. Faye, H. E. Jobson, and L. F. Land. Open-file report 78-528, 1978. 92 p, 31 fig, 10 tab, 21 ref.

Descriptors: *Regulated flow, *Streams, *Power-plants, *Heat flow, *Water temperature, Model studies, Mathematical models, Heat transfer, Un-steady flow. Thalweg, Mannings equation, Roughness(Hydraulic), Diurnal distribution, Tem-perature, *Georgia, *Chattahoochee River(Geo).

A calibrated and verified transient-flow temperature model was used to evaluate the effects of flow regulation and powerplant loadings on the natural temperature regime of the Chattahoochee River in northeast Georgia. Estimates were made of both instantaneous and average natural temperatures in the river during an 8-day period in August 1976. Differences between the computed average natural temperature and an independent estimate of natural temperature based on observed equilibrium temperatures were less than 0.5°C. The combined thermal effects of flow regulation and powerplant effluents resulted in mean daily river temperatures downstreams of the powerplants about equal to or less than computed mean natural temperatures. The range and rates of change of computed natural In erange and rates of change of computed natural diurnal temperature fluctuations were considerably less than those presently observed (1976) in the river. Except during periods of peak water-supply demand, differences between computed year 2000 river temperatures and observed present-day temperatures were less than 2C. (Woodard-USGS) W79-02648

EFFECTS OF BOTTOM SEDIMENTS ON IN-FILRATION FROM THE MIAMI AND TRIBU-TARY CANALS TO THE BISCAYNE AQUIFER,

DADE COUNTY, FLORIDA, Geological Survey, Tallahassee, FL. Water Resources Div.

W. L. Miller.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 080, Price codes: A04 in paper copy, A01 in microfiche.

Water-Resources Investigations 78-36, May 1978. 63 p. 29 fig. 6 tab. 20 ref.

Descriptors: *Groundwater recharge, *Surface waters, *Infiltration, *Water quality, *Canals, Water supply, Aquifers, Withdrawal, Water wells, Saline water intrusion, Drawdown, Bottom sediments, Effects, Canal seepage, Data collections, Water analysis, Chemical analysis, Path of pollutants, *Florida, Dade County(Fla), *Biscayne aguifer(Fla)

Infiltration from the Miami Canal and its tributaries is an important source of recharge to the Biscayne aquifer in the vicinity of the Miami Springs-Hialeah well fields. Estimates of pumpage contributed by canal infiltration decreased from nearly 100 percent in the late 1940's to 50 percent in May 1973 while well field pumpage increased from less than 50 Mgal/d to 120 Mgal/d. As increased withdrawals enlarge the well field's cone of depression, the threat of saltwater intrusion during dry periods has been increased. Data on water quality, water levels, and canal bottom sediments indicate that sediments greatly impede infiltration from the canals in the areas most affected by pumping. Bottom sediments reduce coliform bacteria, pesticides, PCB, metals, and other suspended materials infiltrating canal water. (Woodard-USGS) Infiltration from the Miami Canal and its tributar-

BACTERIOLOGICAL WATER QUALITY OF TULPEHOCKEN CREEK BASIN, BERKS AND LEBANON COUNTIES, PENNSYLVANIA, Geological Survey, Harrisburg, PA. Water Resources Div.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 403, Price codes: A02 in paper copy, A01 in microfiche. Water-Resources Investigations 78-53, April 1978. 25 p, 5 fig, 5 tab, 10 ref.

Descriptors: *Water quality, *Baseline studies, *Water pollution sources, *Coliforms, *Bacteria, Livestock, Surface waters, Runoff, Water analysis, Evaluation, *Pennsylvania, *Tulpehocken Creek basin(Penn), Proposed lake site.

A four month intensive study of the bacteriological quality of water in the Tulpehocken Creek basin in southeast Pennsylvania indicates that (1) the atreams localy contain high densities of bacteria indicative of fecal contamination, (2) nonpoint waste sources, particularly livestock, are the dominant influence in the excessive bacteriological-indicator counts observed, and (3) retention time of water in the proposed Blue Marsh Lake is believed sufficient to reduce bacteria densities to acceptable levels except following intense rainfall and runoff events during normally low-flow periods. (Woodard-USGS)

PRELIMINARY EVALUATION OF THE WATER-SUPPLY POTENTIAL OF THE SPRING-RIVER SYSTEM IN WEEKI WACHEE AREA AND THE LOWER WITHLACOOCHEE RIVER, WEST-CENTRAL FLORIDA, Geological Survey, Tallahassee, FL. Water Re-

sources Div For primary bibliographic entry see Field 4B. W79-02655

WATER QUALITY IN THE SUGAR CREEK BASIN, BLOOMINGTON AND NORMAL, IL-

Geological Survey, Champaign, IL. Water Resources Div.

Available from National Technical Information Service, Springfield, VA 22161 as PB-288 359, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 78-78, 1978. 40 p, 15 fig, 27 tab, 14 ref.

Descriptors: *Water quality, *Urban runoff, *Sewage effluents, *Storm runoff, *Water analysis, Dissolved solids, Dissolved oxygen, Hydrogen ion

concentration, Ammonia, Nitrogen, Phosphorus, Biochemical oxygen demand, Bacteria, Coliforms, Metals, Trace elements, Water temperature, Path of pollutants, *Illinois, *Sugar Creek(III), Bloomington, Normal(III).

mington, Normal(III).

Urban runoff and overflows from combined sewers affect water quantity and quality in Sugar Creek within the twin cities of Bloomington and Normal, Illinois. Water-quality data from five primary and eight secondary locations showed three basic types of responses to climatic and hydrologic stresses. Stream temperatures and concentrations of dissolved oxygen, ammonia nitrogen, total phosphorus, biochemical oxygen demand, and fecal bacteria showed seasonal variations. Specific conductivity, pH, chloride, and suspended solids concentrations varied more closely with stream discharges. Total organic carbon, total nitrogen, total phosphorus, biochemical oxygen demand, and fecal coliform and fecal streptococcal bacteria concentrations exhibited variations indicative of intial flushing action during storm runoff. Selected analyses for herbicides, insecticides, and other complex organic compounds in solution and in bed material showed that these constituents were coming from sources other than the municipal sanitary treatment plant effluent. Analyses for 10 common metals: arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc showed changes in concentrations below the municipal sanitary plant outfall. (Woodard-USGS)

DISTRIBUTION OF DISSOLVED NITRATE AND FLUORIDE IN GROUND WATER, HIGH-LAND-EAST HIGHLANDS, SAN BERNAR-DINO COUNTY, CALIFORNIA, Geological Survey, Menlo Park, CA. Water Re-

sources Div.

No. 12 Sources Div.

L. A. Eccles, and J. M. Klein.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 360, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 78-14, June 1978. 42 p, 11 fig, 1 tab, 19 ref.

Descriptors: *Nitrates, *Fluorides, *Groundwater, *Water quality, *California, *East Highlands, San Bernardino County(Calif).

In the Highland-East Highlands area of southern California, concentrations of nitrate in water from many wells exceed the U.S. Environmental Protection Agency's and the California Department of Health's recommended limit for public water supplies. The nitrate standards for public water supplies. The nitrate standards for public water supplies in the study area are commonly met by blending the high-nitrate water with low-nitrate water before distribution; however, some of the low-nitrate water sources have fluoride concentrations that exceed the optimum level, or in a few cases exceed the maximum level recommended by the California Department of Health. Nitrate-nitrogen concentrations in the study area are generally between 1 and 20 milligrams per liter. In general, nitrate-nitrogen concentrations exceeding 10 milligrams per liter are found in water from wells perforated at depths of less than 500 feet. (Woodard-USCS) dard-USGS) W79-02663

PRELIMINARY HYDROLOGIC BUDGET OF THE SAND-AND-GRAVEL AQUIFER UNDER UNSTRESSED CONDITIONS, WITH A SEC-TION ON WATER-QUALITY MONITORING, PENSACOLA, FLORIDA, Geological Survey, Tallahassee, FL. Water Re-sources Div.

H. Trapp, Jr.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-288 183,
Price codes: A04 in paper copy, A01 in microfiche,
Water-Resources Investigations 77-96, 1978. 57 p,
8 fig, 1 tab, 24 ref.

Descriptors: "Computer models, "Aquifer characteristics, "Hydrogeology, "Water quality, "Path of pollutants, Hydrologic budget, Sewage effluents, Groundwater movement, Potentiometric pollut-

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Sources Of Pollution-Group 5B

ants, Hydrologic budget, Sewage effluents, Groundwater movement, Potentiometric level, Transmissivity, Confined water, Water analysis, Nutrients, Biochemical oxygen demand, Water wells, Withdrawal, Groundwater recharge, *Florida, *Escambia County, *Pensacola(Fla), *Trescott-Pinder model, Sand-and-gravel aquifer, Effluence, *Effluence, *Effluence, *Effluence, *Florida and *Escambia County, *Pensacola(Fla), *Trescott-Pinder model, Sand-and-gravel aquifer, Effluence, *Effluence, *Effl

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The sand-and-gravel aquifer is the only freshwater aquifer in southern Escambia County, Fla. Problems related to the development of the aquifer include sustained yield, contamination, and saltwater intrusion. A digital model was applied to the sand-and-gravel aquifer in central and southern Escambia County treating the aquifer's main producing zone' as a discrete, leaky, confined aquifer. Under conditions of no pumping, most values for the final-head matrix agreed with assumed values within 4 feet in the area of principal interest. Discharge per unit land area was 1.04 cubic feet per second per square mile, in close agreement with the base runoff streams maintained by the aquifer. Total natural aquifer discharge within the area of principal interest determined by the model was 159 million gallons per day. The applicability of the present non-unique calibration for predicting the effects of pumping is questionable; a multi-layered model may be required. Effluent infiltrating from holding lagoons for spray irrigation at the Scenic Hills Sewage Plant may have affected the quality of local perched ground water in the sand-and-gravel aquifer. Observation wells drilled near areas of heavy pumping around Bayou Chico indicated no saltwater intrusion. (Woodard-USGS)

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION, COMPOSITION, AND TRANSPORT OF MICROBIAL BIOMASS AND SUSPENDED MATERIAL IN A SALT MARSH ECOSYSTEM,

South Carolina Univ., Columbia. C. W. Erkenbrecher, Jr. PhD Dissertation. 1976. 210 p.

Descriptors: *Salt marshes, *Aquatic microorgan-isms, *Organic matter, Wetlands, Tidal marshes, Coastal marshes, Aquatic fungi, Chlorophyll, 'De-tritus, Tides, Aquatic bacteria, Suspended load, Sediment transport, Productivity, Estuaries, *South Corolling.

*South Carolina.

The North Inlet Estuary near Georgetown, South Carolina, was the site for the study of the interactions among aquatic microorganisms and the constantly changing physical and chemical environments. Seasonal fluctuations in water properties were superimposed over the tidal and diumal factors. Peak concentrations of adenosine triphosphate (ATP) in the summer months coincided with increases in the amount of chlorophyll a. The appearance of peak concentrations of particulate organic carbon (POC) in the early fall was associated with the die-off and washout of components of the standing crop of Spartina. The strong linear correlation between POC and fungi suggested that the latter were attached to and possibly important in the breakdown of the POC formation. Increases in bacterial abundance were generally associated with substantial periods of fresh water runoff in the winter. Critical differences in magnitude and direction of transport were observed between consecutive tidal cycles due to changing local environmental conditions. Biomass carbon was exported from the marsh at a rate of 6 kg per tidal cycle. This was about 19% of the total POC transported. Occasionally, the resuspension of fine sediments on a flooding tide resulted in a significant import of biomass to the creed. (Steiner-Mass)

EFFECT OF TILLAGE SYSTEMS ON RUNOFF LOSSES OF NUTRIENTS, A RAINFALL SIMU-LATION STUDY,

Iowa Natural Resources Council, Des Moines. For primary bibliographic entry see Field 4C. W79-02680

VOLATILE CHLORO- AND BROMOCARBONS IN COASTAL WATERS, Maryland Univ., College Park, Dept. of Chemis-

try. G. R. Helz, and R. Y. Hsu. Limnology and Oceanography, Vol. 23, No. 5, p 858-869, September 1978. 6 fig, 5 tab, 41 ref. EPA R803839-01/02.

Descriptors: "Water quality, "Chlorination, "Effluents, "Estuaries, "Maryland, Halogens, Chlorine, Carbon, Bromine, Salinity, Volatility, Sampling, Surveys, Rivers, Coasts, Sewage effluents, Analytical techniques, Data processing, Sea water, Chemicals, Chemical analysis, Pollutants, Path of pollutants, Water pollution, "Haloforms, "Back River(MD), Chlorocarbons, Bromocarbons.

Contaminated coastal waters can contain nanomolar levels of Cl and C2 halocarbons originating through in situ synthesis from chlorine and through waste discharge. Haloforms are the major volatile products formed from chlorine. In freshwaters, CHCl3 dominates with lesser amounts of CHBr3 and the mixed Cl-Br haloforms; however, above about 5 g/kg salinity, CHBr3 is virtually the only product when typical chlorine doses (10-100 micro M) are used. On a molar basis, greater than 4% conversion of chlorine to haloforms was observed in some experiments. Samples from the 4% conversion of chlorine to haloforms was observed in some experiments. Samples from the Back River estuary (Maryland), which receives effluent from a very large urban wastewater treatment plant, contained CH2C12, CHC13, CC14, CC12=CHC1, and CC12=CC12 at concentrations exceeding 1 nM. Even when winter ice cover minimized loss of volatilization, downstream mixing was nonconservative, suggesting that chemical or biological degradation processes occur. Under normal circumstances, however, volatilization followed by chemical degradation in the atmosphere is probably the most important loss mechanism. Data on possible biologic effects of these compounds are critically needed. (Sims-ISWS) ISWS) W79-02684

N15/N14 RATIOS OF GROUND-WATER NITRATE, LONG ISLAND, NEW YORK,

Texas Univ. at Austin. Bureau of Economic Geol-

ogy.
C. W. Kreitler, S. E. Ragone, and B. G. Katz.
Ground Water, Vol. 16, No. 6, p 404-409, November-December 1978. 3 fig, 2 tab, 19 ref.

Descriptors: *Groundwater, *Nitrates, *Isotope studies, *New York, Nitrogen, Water pollution, Fertilizers, Agriculture, Farm wastes, Septic tanks, Pollutants, Path of pollutants, Aquifers, Analytical techniques, Wells, Water wells, Water quality, Water pollution sources, *Long Island(NY).

Nitrogen-isotope values (delta N15) of ground-water nitrate on Long Island, New York, correlate with delta N15 ranges of nitrate sources which contribute to the groundwater systems. The delta N15 of nitrate in water from the upper glacial aquifer, the water table aquifer on Long Island, shows a shift from lighter values in the eastern part of the island where land is used predominantly for agriculture, to heavier values toward New York City where land is used for suburgan residences with septic systems or sewers. The delta N15 values for inorganic fertilizer, unfertilized cultivated fields, and animal wastes show a similar shift from low to high values: -3 to +2 parts per thoucu neius, and animal wastes show a similar shift from low to high values: -3 to +2 parts per thou-sand, +2 to +8 parts per thousand, and +10 to +20 parts per thousand, respectively. Nitrogen-isotope ratios of nitrate in water from the deeper Magothy aquifer indicate a mixed source of nitrate. (Sims-ISWS) W79.02689

SOLUTION OF COUPLED NONLINEAR ECO-SYSTEM EQUATIONS,

Hawaii Univ., Honolulu. Dept. of Ocean Engineer-

For primary bibliographic entry see Field 2L. W79-02714

NON-POINT SOURCE WATER QUALITY MONITORING, INVO NATIONAL FOREST.

1976, California Univ., Los Angeles. Environmental Science and Engineering. For primary bibliographic entry see Field 5A. W79-02718

BIOLOGICAL PRODUCTIVITY IN TWO GEORGIA RIVER SWAMPS, Tennessee Univ., Knoxville. For primary bibliographic entry see Field 2H. W79-02720

SIMULATION OF NUTRIENT LOSS FROM SOILS DUE TO RAINFALL ACIDITY, Corvallis Environmental Research Lab., OR.

Publication No. EPA-600/3-78-053, May 1978. 45 p, 12 fig, 4 tab, 18 ref.

Descriptors: *Rainfall acidity, Water analysis, Water chemistry, Soil science, Soil chemistry, Plant nutrition, Ecology, *Simulation analysis, *Model studies, *Nutrients.

A simulation model is described that provides a quantitative system utilizing established relationships from soil chemistry to predict the most likely effect of rainfall acidity on the leaching of cations from noncalcareous soils. The model utilizes the relationships between lime potential (pH - 1/2pCa) and base saturation described by Clark and Hill (Soil Sci. Soc. Amer. Proc. 28:490-492, 1962) and Turner and Clark (Soil Sci. 99:194-199, 1964), the Turner and Clark (Soil Sci. 99:194-199, 1964), the equilibrium between CO2 partial pressure and H+ and HCO3- in solution, the apparent solubility product of AL(OH)3, the equilibrium of cations and anions in solution, the Freundlich isotherm description of ions between the solution and sorbed or exchangeable phases. Ionic composition can thus be computed. Ions considered in the present version are H+, Ca2+, Al3+, SO42-, CL-, and HCO3-. The model predicts almost exact chemical equivalence between basic cation removed in the leachate and strong acid anions entering the system in the rainfall of pH - 1/2pCa is above 3.0, at in the rainfall of pH - 1/2pCa is above 3.0, at which point the base saturation will generally not exceed 20%. At lower pH - 1/2pCa values leaching of anions in association with H+ and Al3+ becomes significant and these cations predominate when pH - 1/2pCa falls below 2.0. (Skogerboe-

TRANSPORT OF AGRICULTURAL CHEMICALS FROM SMALL UPLAND PIEDMONT WATERSHEDS,

Colorado State) W79-02730

WALERSHEIDS,
Environmental Research Lab., Athens, GA.
C. N. Smith, R. A. Leonard, G. W. Langdale, and
G. W. Bailey.
Publication No. EPA-600/3-78-056, May 1978. 364
p, 96 fig, 177 tab, 41 ref, 8 append.

Descriptors: Herbicides, Fertilizers, *Pesticides, Surface runoff, *Small watersheds, *Agricultural chemicals, *Path of pollutants, Water pollution sources, *Southeat US, Southern Piedmont

Data were collected from four small watersheds (1.3 to 2.7 ha) located in the Southern Piedmont region. Two watersheds were managed without conservation measures; the other two watersheds were parallel-terraced and included grassed waterways for soil erosion control. Total losses of applied herbicides were affected by the occurrence of runoff in close proximity to application date, mode of application, and persistence in the soil runoff zone. Most of the total annual losses by runoff were in the first three runoff events for all compounds except paraquet. Runoff of trifluration compounds except paraquat. Runoff of trifluralin was very low (0.1 to 0.3% of the annual application). Total runoff losses of other herbicides were commonly less than 1.0% except when runoff occurred shortly after application. Sediment yield from terraced watersheds was significantly less than from watersheds managed without terraces.

Group 5B-Sources Of Pollution

Except for paraquat, however, pesticide yields in runoff were not reduced in proportion to sediment reduction because solution transport was the major reduction because solution transport was the major mode of loss for the soluble herbicide phase. Annual runoff losses of soluble plant nutrients were 5.0 and 1.3 kg/ha for chloride and nitrate, respectively. Losses of soluble phosphorus from both watersheds were very low, about 380 g/ha. (Skogerboe-Colorado State) W79_02745

A CONCEPTUAL ECOLOGICAL MODEL FOR CHESAPEAKE BAY,

For primary bibliographic entry see Field 2L. W70-02746

ENERGY FLUX IN A TIDAL CREEK DRAIN-ING AN IRREGULARLY FLOODED JUNCUS MARSH

Mississippi State Univ., Mississippi State. Dept. of Zoology.

For primary bibliographic entry see Field 2L W79-02748

FACTORS AFFECTING TEMPERATURE AND SALINITY CONDITIONS ON A SCOTTISH SALT-MARSH, WITH NOTES ON THE ECOLOGY OF SPHAEROMA RUGICAUDA

Edinburgh Univ. (Scotland). Dept. of Zoology. For primary bibliographic entry see Field 2L. W79-02754

SOILS OF THE INTER-TIDAL MARSHES OF DIXIE COUNTY, FLORIDA.

Florida Agricultural and Mechanical univ., Talla-hassee. Dept. of Soil Science.

For primary bibliographic entry see Field 2G.

CHEMICAL CHARACTERISTICS OF A FEED-LOT SOIL PROFILE,

Agricultural Research Service, Lincoln, NE. G. E. Schuman, and T. M. McCalla. Soil Science, Vol. 119, No. 2, p 113-118, February, 1975. 6 fig, 2 ref.

Descriptors: *Feedlots, *Soil profiles, *Soil chemical properties, Nitrates, Potassium, Impermeable

This study was made to determine the chemical composition of feedlot profiles, which might be helpful in understanding the characteristics of feedlot soil profile and the effects of the observed characteristics on the profile. The exchange complex was predominantly saturated with K in the top 15 cm of the soil profile immediately below the manure pack. Ca became the dominant ion below that depth. The high K resulted from large amounts of K in the rations fed to the livestock. The zone where high levels of K were present was also high in carbon. This zone was very dark and slightly more dense than the material above and below. The permeability of this dark layer was low. Soil columns leached with CaCl2 allowed percolation to occur, which indicated that the sealpercolation to occur, which indicated that the sealing was at least partially due to the K. No percolate resulted from the distilled water of KCl solution treatments. NO3-N was very low under the impermeable layer and severalfold higher in the field profile. (Cartmell-East Central Oklahoma)

CHARACTERIZATION AND EVALUATION OF WASTEWATER, UNITED STATES STEEL CORPORATION, HOMESTEAD WHEEL AND AXLE PLANT, MCKEES ROCKS, PENNSYL-VANIA, AUGUST 21-28, 1975.

National Enforcement Investigations Center, Denver, CO.

For primary bibliographic entry see Field 5G. W79-02791

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES, UNITED STATES STEEL CORPORATION, DUQUESNE PLANT, PITTSBURGH, PENNSYLVANIA, FEBRUARY 26-MARCH 6, 1976.

National Enforcement Investigations Center,

For primary bibliographic entry see Field 5G. W79-02793

PCBS WATER ELIMINATION/REDUCTION TECHNOLOGY AND ASSOCIATED COSTS, MANUFACTURERS OF ELECTRICAL CAPACITORS AND TRANSFORMERS, Versar, Inc., Springfield, VA. For primary bibliographic entry see Field 5D. W79-02800

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES UNITED STATES STEEL CORPORATION, EDGAR THOMPSON PLANT, PITTSBURGH, PENN-SYLVANIA, JULY 22-AUGUST 5, 1975. National Enforcement Investigations

Denver, CO. For primary bibliographic entry see Field 5G. W79-02801

STABILITY OF HUMAN ENTEROVIRUSES IN ESTUARINE AND MARINE WATERS, Maryland Univ., College Park. Dept. of Microbi-

ology. S. Lo, J. Gilbert, and F. Hetrick

S. Lo, J. Gilbert, and F. Hetrick.
Available from the Natinal Technical Information Service, Springfield, VA 22161 as AD-A033 356, Price codes: A02 in paper copy, A01 in microfiche. Applied and Environmental Microbiology, Vol. 32, No. 2, p. 245-249, August 1976. 5 p, 4 fig, 3 tab, 12 ref. N0014-67-0239-0035.

Descriptors: *Enteric viruses, *Water pollution sources, *Estuaris, *Estuarine environment, *Marine environment, Laboratory tests, On site tests, Salinity effects, Saline waters, Temperature effects, Water temperature, Viability, Microbiology, Viruses, Human diseases, Water pollution effects.

Three enteric viruses, poliomyelitis type 1, echoviurus-6, and coxsackieviurs B-5, were studied to determine the effects of temperature and salinity on their survival. Marine and estuarine in situstudies and controlled laboratory studies conducted indicated that temperature rather than salinity is the critical factor affecting their stability: higher temperatures resulted in a more rapid loss of viral the critical factor affecting their stability: nigner temperatures resulted in a more rapid loss of viral activity. All the viruses were stable at 4C, with coxsackievirus B-5 being the most stable, showing activity after 53 weeks incubation at all salinities in the laboratory. In situ study results indicated that these viruses are more labile in natural waters than in artificially prepared marine and estuarine waters. Coxsackievirus B-5 was the most stable under all conditions, echovirus-6 was intermediate, and poliovirus type 1 was the least stable. (Davison-IPA)

CHARACTERIZATION TANKER SLOP WATERS. OF PRODUCT

Exxon Research and Engineering Co., Florham Park, NJ. Environmental Control and Safety Div. J. E. Shewmaker.

J. E. Snewmaker.

Available from the National Technical Information Service, Springfield VA 22161 as PB-254 987, Price codes: A04 in paper copy, A01 in microfiche. Final Report Nos. MA-RD-930-76054 and EE.10TMR.76, June 1976. 53 p, 1 fig, 28 tab, 20 ref, 1 append. C-5-3800.

Descriptors: *Water pollution sources, *Waste identification, *Ships, *Chemical analysis, Sampling, Testing, Oil wastes, Water pollution control, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Phenols, Organic wastes, Organic compounds, Sulfides, Bilge water, Treatment facilities, Design criteria, Waste water treatment Slop Missel. treatment, Slop water.

The slop and bilge waters of seven product tankers were sampled and analyzed, and their pollution characteristics were determined to provide a basis for planning shore treatment facilitis for product tanker waste waters. Product residues contaminating the waters included: regular, high test, and unleaded gasoline; heating oils; No. 5, No. 6, and low sulfur fuel oils; diesel fuel; kerosene; and aromatic naphthas and solvents. Samples were analyzed for the following parameters: total oil, chemical oxygen demand (COD), biochemical oxygen demand (COD), biochemical oxygen demand (TOD), suspended solids, phenols, sulfides, ammonia, and pH. Oil was the principal pollutant; COD, BOD5, and suspended solids often exceeded regulatory limits for discharge from shore stations. Occassional significant levels of phenols and sulfides were found in slop waters but rarely in bilge waters. Ammonia and pH were not significant pollutants in these waters. It is noted that if the treatment of tanker waste waters is to be combined in facilities treating fresh water waste streams, the possible harmful effects of salinity and the hydraulic and contaminant loadings must be considered. (Davison-IPA) W79-02805

USE OF NEUTRON ACTIVATABLE TRACERS FOR SIMULATING WATER AND CHEMICAL FLOW THROUGH POROUS MEDIA,

FLOW THROUGH POROUS MEDIA,
Pennsylvania State Univ., University Park. Dept.
of Nuclear Engineering.
F. G. Haaser, W. A. Jester, W. R. Heald, A. S.
Rogowski, and H. B. Pionke.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 337,
Price codes: A14 in paper copy, A01 in microfiche.
Research Project Technical Completion Report,
September, 1978. 317 p, 65 fig, 10 tab, 118 ref, 8
append. OWRT A-046-PA(2), 14-34-0001-6039.

Descriptors: *Halogens, *Bromides, *Iodides, *Water pollution sources, *Tracers, *Ground-water, *Neutron activation analysis, *Hydraulic conductivity, Chlorine, Soil water movement, Path of pollutants, *Radioactive tracers, Deep system, Shallow soil system, Post-sampling, Hydraulic ve-

The need for non-contaminating underground water tracers is significant. The imbalance between the natural distribution of water in space and time and the distribution man desires will grow with time. This study examines the application of three halogen water tracers - bromine, iodine, and chlorine - and offers recommendations on their acceptibility for the provide of the property of the provide of the provi rine - and offers recommendations on their accepti-bility for use in various soils. The bromide ion is a most dependable, accurate tracer for monitoring tests at different well sites. In one test this ion reproduced the accuracy of tritiated water, the best recognized but radioactive and therefore 'pol-luting' tracer. Application results for the iodide ion as a tracer are described for water tracing of 'deep' systems and limited success for shallow soil sys-tems are demonstrated. The chloride ion, is acceptable for water tracing in a shallow soil system. Simultaneous injection of combinations of these Simultaneous injection of combinations of these inexpensive tracers into water systems, and subsequent detection using post-sampling neutron activation analysis allows an independent estimation of average hydraulic velocities and the calculation of hydraulic conductivities from classical hydrologic methods. (Sink-Penn State)

ANALYSIS AND CHARACTERIZATION OF TRACE ELEMENTS IN SHALE OIL PROD-UCTS BY INSTRUMENTAL NEUTRON ACTI-VATION ANALYSIS, Missouri Univ.-Columbia. Dept. of Chemistry. For primary bibliographic entry see Field 5A. W79-02822

DISSOLUTION POTENTIAL OF SURFICIAL MANCOS SHALE AND ALLUVIUM,

Colorado State Univ., Fort Collins. J. B. Laronne.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 464,

Price of PhD I ref, ap 5061.

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WATER QUALITY MANAGEMENT AND PROTECTION_Field 5

Sources Of Pollution-Group 5B

Price codes: A07 in paper copy, A01 in microfiche. PhD Dissertation, 1977. 128 p, 21 fig, 13 tab, 53 ref, append. OWRT B-121-COLO(1), 14-31-0001-5061.

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Descriptors: *Salinity, *Colorado River Basin, *Mancos Shale, Salt source, *Salts, *Sulfates, *Dis-solved solids, *Alluvium, *Sediments, Salt depos-its, Water chemistry, Conductivity, *Dilution,

Water quality.

The objectives were to determine the salt content of Mancos Shale and associated alluvium and the release mechanisms of salt from these deposits. When mixed with distilled water, the time necessary to approach equilibrium decreased with an increase of salt content and with a decrease of sediment concentration, and the time span required for equilibrium ranged from a few minutes to several days. The chemical quality of the aqueous mixtures was of the Ca2+-MG2+-Na1+-SO42-HCO31- type. Sodium and magnesium hydrated sulfates appeared to dissolve faster than gypsum or calcite and the relative abundance of Na1+, Mg2+ and SO42- decreased with increased dilution. There is a large inherent variability in the salt content of Mancos Shale from hillslopes (2 percent) is significantly larger than that of terrace alluvium (0.62-0.29 percent) and bed materials (0.93-0.81 percent) of North Miller and West Salt Creeks respectively. The most saline deposits (10 percent) are efflorescent bed crusts. Terrace and bed materials in narrow valleys where shallow alluvium overlies shale are highly saline (1.6 percent) and show an increase in salt content with depth. The results also show that major areas of diffuse sources of salts are also the major sediment contributors in the Upper Colorado River Basin. W79-02827 W79_02827

IMPLEMENTATION AND EVALUATION OF THE USE OF A TRANSIENT FLOW MODEL IN ASSESSING THE IMPACT OF URBAN STORMWATER RUNOFF ON THE WATER QUALITY OF THE TENNESSEE RIVER AT KNOXVILLE,

Tennessee Univ., Knoxville.

J. L. Hamby.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 462, Price codes: A06 in paper copy, A01 in microfiche. MS Thesis, March 1977. 97 p, 41 fig, 7 tab, 9 ref, 3 append. OWRT A-043-TENN(2).

Descriptors: *Urban runoff, *Storm runoff, Water quality, Model studies, Evaluation, *Tennessee, Knoxville(Tenn), *Transient flow models, Sampling, Methodology, *Tennessee River(Tenn), Flow, Runoff, *Dissolved oxygen, Conductivity, Water temperature, Coliforms, Bacteria, Monitoring, Hydrogen ion concentration, Biochemical oxygen demand.

This study was part of an ongoing research project concerned with the impact of urban stormwater runoff on the water quality of the Tennessee River at Knoxville. This study attempted to implement the use of a transient flow model for examination of water quality during runoff events. Specifically, of water quality during runoff events. Specifically, the model was used to trace a slug of water from a point on the Tennessee River above Knoxville to a point below the city during a runoff event. A sampling methodology was developed which, when used in conjunction with the flow model, allowed graphical prediction of water quality changes in the slug of water as it moved past the city. Application of the flow model to this research provided little information into the analysis of the effects of urban stormwater runoff on the water quality of the receiving river. Specific parameters monitored include temperature, dissolved oxygen, pH, conductivity, biochemical oxygen demand and fecal coliform bacteria. For the five test runs included in this study, only one parameter, dissolved oxygen, was observed to exceed stream standards. No general trends could be determined for any of the parameters which seemed to fluctuate according to conditions specific to each rainfall-runoff event. W79-02828

INTERACTION BETWEEN LANDFILL LEA-CHATES AND CARBONATE-DERIVED RESID-

UAL SOILS,
Missouri Univ.-Columbia. Dept. of Geology.
D. L. Williams.

D. L. Williams, Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 463, Price codes: A06 in paper copy, A01 in microfiche. M. A. Thesis, August 1974, 99 p. 15 fig. 12 tab, 33 ref. 2 append. OWRT B-077-MO(2), 14-31-0001-2609.

Descriptors: *Groundwater, *Organic carbon, *Landfill leachate, *Missouri, *Landfills, Sampling, Pollutant identification, Residual soils, Carbonates, Iron, Sulfate, Hydrogen sulfide, *Percolation, Kaolinite, Absorption, Water pollution

One of the major sources of organic carbon in ground water systems in Missouri is leachate from improperly located and/or improperly operated sanitary landfills. Several leachate samples were collected from eight landfill operations in Missouri and analyzed for twenty-one constituents including organic carbon, iron, sulfate, and hydrogen sulfide. The mean organic carbon content of the leachates studied was approximately 4,000 mg/l carbon. These landfill leachates are typically about 40 times more potent than septic tank or sewage treatment plant effluent in terms of their relative ability to lower the redox potential of groundwater systems. to lower the redox potential of groundwater sys-tems. Percolation experiments were conducted to tems. Percolation experiments were conducted to evaluate the capacity of the kaolinitic soils from central and southern Missouri to remove organic carbon from leachate. This study showed that less than 5 percent of the organic carbon is removed from the leachate by absorption or entrapment by this kind of treatment. This suggests that sanitary landfills located on residual soils in the Ozarks region of Missouri may pose a greater threat to groundwater quality than is presently suspected. (Carpenter-Missouri) W79-02829

POLLUTION FORECAST IN STREAMS,

Missouri Univ.-Columbia. Dept. of Civil Engineer-

ing. C. Hung-Darth.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 440, Price codes: A06 in apper copy, A01 in microfiche. MS Thesis, July 1978. 92 p, 40 fig. 7 tab, 47 ref. 2 append. OWRT A-103-MO(1), USDI-OWRT-14-34-0001-8027.

Descriptors: Accidental spills, *Dispersion, Dispersion coefficient, Fickian models, Longitudinal dispersion, *Modified Fickian models, *Pollution forecast, River, *River pollution, Streams, Water pollution sources, *Forecasting, *Model studies, Missouri, United States, Methodology.

Pollution forecast for major rivers in the U.S. necessitates the use of a simple one-dimensional model of dispersion. The Fickian one-dimensional model does not adequately describe longitudinal dispersion in natural stream. A modified Fickian model is proposed herein which is able to describe dispersion in natural streams adequately. A procedure is suggested for using this modified Fickian model for pollution forecast in rivers such as the Missouri. W79-02831

A PRELIMINARY INVESTIGATION OF THE PHOSPHORUS LOADING CHARACTERISTICS OF LAKE CARNEGIE, PRINCETON, NEW JERSEY,

Rutgers - The State Univ., New Brunswick, NJ. Dept. of Chemical and Biochemical Engineering. R. B. Paterson.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 418, Price codes: A07 in paper copy, A01 in microfiche. M.S. Thesis, August 1977, 131 p., 57 fig. 14 ref, 6 append. OWRT A-047-NJ(2), 14-34-0001-7064.

Descriptors: Lakes, Sedimentation, Chemical analysis, Plant growth, Water polluton sources, Water

pollution effects, *New Jersey, *Lake Carnegie(NJ), *Path of pollutants, Nutrients, *Phosphorus, *Phosphates, Eutrophication, Algae,

Phosphorus transport to Lake Carnegie, Middlesex County, New Jersey, has been studied intensively. Results are consistent with the observed highly eutrophic state of the Lake. Discharges accompanying severe storm events, characterized by a lower flow exceeded only 10% of the time, account for more than half the total phosphorus burden. Point-source impacts are difficult to assess. The Stony Brook behaves relatively simply; point dischargers are a well-defined, small portion of the total load. The Millstone River behaves in a very complex fashion, as a 'natural' tertiary treatment system. Point-source loads, estimated from NPDES data, are twice as large as calculated total loads. Thus, phosphorus is removed by in-stream NPDES data, are twice as large as calculated total loads. Thus, phosphorus is removed by in-stream processes. Baseflow loads are a combination of low- and moderate-flow background and point-source discharges, with removal. Very high flow transport dominates phosphorus movement, contributing to the Lake biological state. The Stony Brook and Millstone River contribute nearly equally. Phosphorus from point sources in the Upper Millstone Basin is greatly reduced before reaching the Lake. Formal treatment to reduce phosphorus from point discharges may have marginal impact on Lake state.

W79-02835

A THREE-DIMENSIONAL GALERKIN FINITE ELEMENT MODEL FOR THE ANALYSIS OF CONTAMINANT TRANSPORT IN VARIABLY SATURATED POROUS MEDIA, USER'S

Waterloo Univ. (Ontario). Dept. of Earth Sciences.

Waterioo Uliv. Collaboration of Segol. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 326, Price codes: A10 in paper copy, A01 in microfiche. Report June 1976. 210 p. 10 fig. 2 tab, 12 ref. OWRT C-5224(No 4214) (4), 14-31-0001-4214.

Descriptors: *Groundwater flow, *Mass transport, Finite element method, *Finite element analysis Equations, *Porous media, Computer programs, *Infiltration, *Model studies, *Path of pollutants, Water pollution sources

Solutions of the three-dimensional equations for Solutions of the three-dimensional equations for flow and mass transport in a saturated-unsaturated porous medium are obtained by the Galerkin-finite element method. The corresponding computer code written in FORTRAN IV language is presented, as well as its two-dimensional counterpart. Usage information is provided for both models. A one-dimensional infiltration problem is used to check the procedure. The results are found in agreement with existing experimental data. W79-02838

LONG-TERM ASPECTS OF THE ENVIRON-MENTAL BURDEN FROM ENERGY PRODUC-TION: CO2 AND 3H, (IN GERMAN), Kernforschungsanlage Juelich G.m.b.H. (West Germany). Programmgruppe Systemforschung und Technologische Entwicklung. For primary bibliographic entry see Field 5A. W79-02855

THE ACCUMULATION, TRANSLOCATION AND DEGRADATION OF BIOCIDES AT LAND WASTEWATER DISPOSAL SITES: THE FATE OF MALATHION, CARBARYL, DIAZINON, AND 2,4-D BUTOXYETHYL ESTER,

California Univ., Berkeley. Sanitary Engineering

Research Lab.
D. Jenkins, S. A. Klein, M-S. Yang, R. J. Wigenet, and J. W. Biggar.
Water Research, Vol. 12, p 713-723, 1978. 5 fig, 5

Descriptors: *Pesticides, *Waste water disposal, *Water quality, *Translocation, *Water quality, *Translocation,
*Degradation(Decomposition), Waste water treatment, Waste disposal, Public Health, Pesticide ki-

Group 5B-Sources Of Pollution

netics, Pesticide residues, 2,4-D, Diazinon, Water reuse, Irrigation water.

Waste disposal on the land has been practiced since pre-Biblical times and the capacity of the land to purify wastewater has often been demonstrated. It is, however, necessary to examine the large-scale and widespread use of land wastewater disposal in the context of current regulatory attitudes, for its effect on both the land, the water quality of adjacent or underlying waters, and for associated risks (public health or otherwise). This research addresses the specific problems of translocation and accumulation of biocides during the spray irrigation of wastewater, (EIS-Deal) wastewater. (EIS-Deal) W79-02890

CHLORINATED PESTICIDES AND HEAVY METALS IN STREAMS AND LAKES OF NORTHERN MISSISSIPPI WATER, Rust Coll., Holly Springs, MS.
T. I. Rihan, H. T. Mustafa, G. Caldwell, Jr., and L.

Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 568-572, 1978. 2 fig, 2 tab, 4

Descriptors: *Lead, *Mercury, *DDT, *Pesticide residues, Aldrin, Heptachlor, Water quality, Water analysis, Water chemistry, Chlorinated hydrocarband, pesticides, Heavy metals, Gas chromatography, Physicochemical properties, Agricultural chemicals, Pesticide kinetics, Mississippi, *Lin-

Water from several Northern Mississippi sources was analysed for; several basic characteristics (e.g. was analysed for; several basic characteristics (e.g. hardness, pH, etc.); water soluble heavy metal ion concentration; and organic pesticide content. The relative absence of lead and mercury and the abundance of several pesticides, especially DDT were attributed to the agricultural nature of the region. (FIS-Deal)

FATE AND EFFECTS OF CRUDE OIL SPILLED ON PERMAFROST TERRAIN, FIRST

YEAR PROGRESS REPORT,
Army terrestrial Sciences Center, Hanover, NH.
C. Collins, F. Deneke, T. Jenkins, L. Johnson, and
T. McFadden.

T. McFadden. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 140, Price codes: A02 in paper copy, A01 in microfiche. Environmental Protection Agency, Special Report 76-15, 18 p, November 1976. 14 fig, 4 tab, 3 ref.

Descriptors: *Oil, *Oil spills, *Pipelines, *Perma-frost, Oil pollution, Alaska, Tundra, Frozen ground, Soil types, Chemical degradation, Organic compounds, Microbial degradation, Path of pollut-ants, Physicochemical properties, *Crude oil.

The long-term effects and ultimate fate of crude oil The long-term effects and ultimate fate of crude oil spilled on permafrost-underlain tundra is the subject of this study. The project involves two experimental oil spills of 2000 gallons each on 500-m2 test plots near Fairbanks, Alaska. A winter spill, discussed in this progress report, took place in February 1976. Another spill will take place at the peak of the growing season in the summer. This solution continues required the property of the proving season in the summer. This allows conditions prevailing during these climatic periods to be studied as to their effect on oil spills, and makes it possible to study the reaction of the spilled oil to these temperature extremes. Monitoring of the spill and control plots includes: oil movement, temperature regime, biological effects, microbiological changes, permafrost impact, and chemical degradation of the oil. (EIS-Deal)

THE POTENTIAL AND REALIZED INFLUENCES OF TEMPERATURE ON THE DISTRIBUTION OF FISHES IN THE NEW RIVER, GLEN LYN, VIRGINIA, VIrginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.

For primary bibliographic entry see Field 5C. W79-02903

THE EFFECT OF ORGANIC CARBON ON THE CONCENTRATIONS OF IRON AND HYDROGEN SULFIDE IN GROUND WATER, Missouri Univ.-Columbia. Dept. of Geology. For primary bibliographic entry see Field 5A. W79-02908

ADSORPTION, MOBILITY AND DEGRADA-TION OF CYANAZINE AND DIURON IN SOILS.

Nebraska Univ., Lincoln, Dept. of Agronomy.

Neoraska Univ., Lincoln. Dept. of Agronomy. J. T. Majka.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 564. Price codes: A03 in paper copy, A01 in microfiche. MS Thesis, January 1976, 40 p. 7 fig. 5 tab, 30 ref, append. OWRT B-030-NEB(2), 14-34-0001-5087.

Descriptors: "Herbicides, "Adsorption, "Mobility, "Cyanazine, "Diuron, "Path of pollutants, "Clays, Loam, Soils, Soil types, "Adsorption, "Degradation(Decomposition)."

Cyanazine and diuron movement in a Monana silty clay loam soil in the field was not detected at soil depths below 5 cm in plots receiving cumulative amounts of water totaling 20 cm over a 34-day period. In hand-packed soil columns, surface applied diuron and cyanazine penetrated to depths of 10 and 20 cm, respectively, when leached over a time period and with amounts of water similar to that used in the field. Soil thin layer chromatography and adsorption isotherms studies showed diuron to be more strongly adsorbed than cyanazine. Both compounds showed greater degradation rates at the higher temperatures when studied at 4, 20, 35 and 50C and over a 20-week period. Degradation was slowest at 5C in a Valentine loamy fine sand. Diuron appeared to breakdown most readily at 35C. Cyanazine was usually decomposed by the at 35C. Cyanazine was usually decomposed by the 10th week at 5C and the 5th week at higher temperatures.

ATRAZINE PERSISTENCE IN A VALENTINE LOAMY FINE SAND PROFILE,

Nebraska Univ., Lincoln. Dept. of Agronomy For primary bibliographic entry see Field 5A. W79-02910

A CHEMICAL MODEL OF HEAVY METALS IN THE GREAT SALT LAKE.

IN THE GREAT SALT LAKE,
Utah Agricultural Experiment Station, Logan.
A. E. Van Luik, and J. J. Jurinak.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 557,
Price codes: A08 in paper copy, A01 in microfiche.
Research Report 34, June 1978, 155 p, 14 tab, 8 fig.
71 ref, 2 append. OWRT A-038-UTAH(1), 14-340001-8047.

Descriptors: *Heavy metals, Brines, Sediments, Lead(Element), Cadmium, *Utah, *Path of pollut-ants, Trace elements, Model studies, Toxic metals, Water pollution sources, *Great Salt Lake(Utah), Brine-sediment exchange.

The objective was to provide quantitative informa-tion for management decisions in dealing with toxic heavy metal inflows into a salt water body. The method was to develop a model to describe the chemistry of these trace metals in highly con-centrated electrolyte solutions (Great Salt Lake centrated electrolyte solutions (Great Salt Lake brine). This was accomplished by expanding an existing model based on the cluster integral expan-sion theory of electrolyte solution structure into a comprehensive thermodynamic model describing the equilibrium chemistry of the major and minor components of brines, including heavy metals pres-ent in trace amounts. The model receives molar ion ent in trace amounts. The model receives molar ion concentrations, pH, and temperature as input data. Solution density, water content, and total solute content are computed internally to express the molar input data in terms of equivalents per kilogram of solvent, which is the internal working unit for concentration. The internal supporting routines for the otherwise completely general model restrict the applicability of this model to sodium chloride dominated brines of ionic strengths from 2

to 6 molal. Temperature compensations were included to make the model applicable to solutions from 10 to 35 degrees centigrade. Other existing models have been shown applicable to more dilute solutions. The model was applied to predict the solubility of copper, lead, cadmium and zinc in samples taken from the north arm of the Great Salt Lake. W79-02913

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PCBS INVOLVEMENT IN THE PULP AND PAPER INDUSTRY.

PAPER INDUSTRY,
R. A. Carr, G. Y. Contos, R. L. Durfee, C. C. V.
Fong, and E. G. McKay.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-271 017,
Price codes: A06 in paper copy, A01 in microfiche.
Environmental Protection Agency, Report EPA
506/6-77-05, Versar Inc., Final Task Report 4745A, 110 p, February 25, 1977.

Descriptors: *Polychlorinated biphenyls, *Pulp and paper industry, Wastes, Industrial wastes, Water pollution sources, Waste water(Pollution), Costs, Waste water treatment, Pollutants, Water pollution treatment, Pulp wastes, Effluents, Car-bonless paper.

Sources, distribution, and losses of PCBs in the U.S. pulp and paper industry are discussed. The major source was recycled carbonless copy paper manufactured from 1957 to 1971, but amounts of PCBs from this source diminished rapidly after 1971. A model showing past and projected PCB contents in paper products and waste waters is presented and discussed. Costs for effluent treatment to achieve 1 ppb of PCB in industrial effuents (under worst conditions) are estimated, indicating that such treatment will increase product costs by 3-5%. (Brown-IPC) W79-02920

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK BIGHT, FIRST AND SECOND MONITORING CRUISES, NOVEMBER 1975 AND MARCH

National Oceanic and Atmospheric Administra-tion, Boulder, CO. Marine Ecosystems Analysis Program Office.

For primary bibliographic entry see Field 5C. W79-02922

CHEMICAL LIMNOLOGY OF GEORGIAN

Department of Fisheries and Environment, Burlington (Ontario). Water Quality Branch. For primary bibliographic entry see Field 5A W79-02923

CHEMICAL SEWAGE SLUDGE DISPOSAL ON LAND (LYSIMETER STUDIES) VOLUME II, Department of Fisheries and Environment, Ottawa (Ontario). Wastewater Technology Centre; and Ontario Ministry of the Environment, Toronto. Pollution Control Branch. For primary bibliographic entry see Field 5E. W79-02924

AN APPRAISAL OF THE HYDROGEOLOGICAL PROCESSES INVOLVED IN SHALLOW SUBSURFACE RADIOACTIVE WASTE MANAGEMENT IN CANADIAN TERRAIN,

Department of Fisheries and Environment, Ottawa (Ontario). Water Resources Branch.
G. E. Grisak, and R. E. Jackson.

Scientific Series No. 84, 1978, 194 p., 54 fig., 282 ref. 28 tab.

Descriptors: "Hydrogeology, Geology, "Radioactive wastes, "Management, "Subsurface drainage, "Terrain analysis, Appraisals, Nuclear energy, Groundwater, Liquid wastes, Velocity, Hydrologic aspects, Conductivity, Canada, "Chalk River, "Bruce, "Whiteshell, "Suffield, Ontario, Manitoba,

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Effects Of Pollution-Group 5C

The Hydrogeological aspects of the problem of low-level radioactive waste management are introduced with a discussion of the Canadian nuclear power program; the nature of radioactive wastes and their rates of production; and the half-lives and health affects of 'waste' radionuclides. As well, a general account is given of the present Canadian policy and procedures for licensing radioactive waste management sites. Following this introductory material, a detailed account is presented of the geohydrologic processes controlling the transport of radionuclides in gfoundwater flow systems and the attendant geochemical processes causing the retardation of the radionuclides. These geohydrologic and geochemical processes (i.e., hydrogeological processes) can be evaluated by the measurement of certain variables such as aquifer dispersivity, cation-exchange capacity, and total competing cations. To assess the possible importance of each variable in Canadian terrain, a comprehensive discussion of presently available (Canadian) data that have been compiled pertaining to each variable is presented. A description is then given of the hydrogeology of and the waste management experiences at radioactive waste management experiences at radioactive waste management itse at Chalk River, Ontarion; Bruce, Ontario; Whiteshell, Manitoba; and Suffield, Alberta. Along with this description there is a brief evaluation of those geohydrologic and geochemical processes that may be of importance at these sites. (WATDOC) W79-02926

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CONTRIBUTION OF CHRONIC PETROLEUM INPUTS TO NARRAGANSETT BAY AND RHODE ISLAND SOUND SEDIMENTS, Rhode Island Univ., Kingston. Graduate School of

Rhode Island Univ., Kingston, Graduate School of Oceanography. E. S. Van Vleet, and J. G. Quinn. Rhode Island University Marine Reprint No. 112. Reprinted from: Journal of the Fisheries Research Board of Canada, Vol 35, no 5, p 536-543. 1978. 2 fig, 3 tab, 29 ref. SG-04-80M01-147.

Descriptors: *Sediments, *Water pollution sources, *Municipal wastes, *Oil pollution, Estuaries, Coasts, Rhode Island, Hydrocarbons, Petroleum hydrocarbons, Narragansett Bay, Gulf of Maine, Biogenic hydrocarbons, Crude oil.

Sediment cores from Narragansett Bay and Rhode Island Sound have been analyzed for petroleum hydrocarbons and compared with a relatively unpolluted sediment core from the Gulf of Maine. The sediments were analyzed for unbound hydrocarbons, hydrocarbons bound or closely associated carbons, hydrocarbons bound or closely associated with humic substances, and residual hydrocarbons bound or closely associated with the clay mineral or kerogen matrix. Results indicated that in general or kerogen matrix. Results indicated that in general or kerogen matrix. Results indicated that in general form and could be easily extracted with organic solvents. The petroleum hydrocarbons decreased with depth at all stations. Biogenic hydrocarbons made up an increasingly greater percentage of the total with increasing depth. The hydrocarbons in the Narragansett Bay sediments and near surface Rhode Island Sound sediments strongly resembled the hydrocarbons previously reported for the Providence River and upper Narragansett Bay. These petroleum-like hydrocarbons were shown to be largely introduced to the river and bay through These petroleum-like hydrocarbons were shown to be largely introduced to the river and bay through chronic inputs from a municipal wastewater treatment plant. These hydrocarbons then undergo sedimentation throughout the entire bay and into Rhode Island Sound. Preliminary calculations indicate that over 0.2 million t (tonne) of petroleum hydrocarbons may be transported to the marine environment annually from municipal treatment plants. (NOAA)
W79-02942

AN EXPOSURE SCALE FOR MARINE SHORES IN WESTERN NORWAY,

Imperial Coll. of Science and Technology, London (England). Dept. of Botany.
D. H. Dalby, E. B. Cowell, W. J. Syratt, and J. H. Crothers.

Journal of the Marine Biological Association of the United Kingdom, Vol. 58(4), 1978, p. 975-990, 2 tab., 5 fig., 33 ref.

Descriptors: *Monitoring, *Atlantic Ocean, Oil, Oil pollution, Oil spills, *Methodology, Industrial wastes, Molluscs, Waves(Water), Fjords, *Bioindicators, North Sea, Lichens, Biological communities, *Rocky shore, Exposure scale, Fensfjord area, Western Norway, Oil refineries, Nucella, Norwegian coast, Black Lichen Zone, Specie abundance

A rock shore exposure scale, intended primarily for use in biological monitoring sites in the Fensfjord area, Western Norway, has been prepared.
This scale is developed from an earlier scale devised for Milford Haven, Wales, making use of
species abundance curves along the wave exposure
gradient. Independent evidence for the validity of
the scale is provided by shell shape variation in
Nucella lapillus and by the height of the black
lichen zone in the supralittoral fringe. The successive steps in the preparation of the scale are outlined, definitions of the exposure grades are given
in tabular form for the restricted set of species
analysed numerically and descriptions are provided in an extended form to provide a fuller
picture for users of the scale. It is believed that the
scale will prove applicable to other rocky shores
around the Noth Sea. (EIS-Katz)
W79-02964 W79_02964

ACCELERATED RATE OF ALBINISM IN CHANNEL CATFISH EXPOSED TO METALS, Thomas Hunt Morgan School of Biological Sciences, Lexington, KY. For primary bibliographic entry see Field 5C. W79-02967

DISCHARGE OF SOLIDS FROM FISH PONDS, Fish Farming Experimental Station, Stuttgart, AR. J. E. Ellis, L. T. Dewey, and R. R. Carter. The Progressive Fish Culturist, Vol. 40(4) 1978. p. 165-166. 1 tab., 4 ref.

Descriptors: *Aquiculture, Fish establishment, *Fish farming, Fish handling facilities, *Fish hatcheries, Fish management, Fish ponds, Biomass, Fish populations, *Arimal wastes(Wildlife), Suspended solids, Waste treatment, Waste water, Sources of pollution.

Water samples were collected from effluents of fish ponds and analyzed for setteable, nonsetteable, and suspended solids. Fish biomass in ponds was not consistently associated with amounts of setteable or nonsetteable solids, but was correlated with amounts of suspended solids. The amount of solids discharged was relatively small, suggesting little or no pollution of receiving waters. (EIS-Katz) W79-02970

HYDRODYNAMIC TRANSPORT PHENOM-ENA IN ESTUARIES AND COASTAL WATERS, SCOPE OF MATHEMATICAL MODELS, Waterloopkundig Lab., Delft (Netherlands) and Rijkswaterstaat, Rijswijk (Netherlands). Data

For primary bibliographic entry see Field 2L. W79-02983

A MEASURE OF RESPONSE TO PERTURBA-TION USED TO ASSESS STRUCTURAL CHANGE IN SOME POLLUTED AND UNPOL-LUTED STREAM FISH COMMUNITIES, Delaware Univ., Newark. Dept. of Biological Sci-

H. Cornell, L. E. Hurd, and V. A. Lotrich. Oecologia, Vol. 23, p. 335-342, 1976. 1 fig., 2 tab.,

Descriptors: Mathematical studies, *Statistical methods, *Biological communities, Sampling, Dominant organisms, Bioindicators, Water pollution, Water pollution effects, Sedimentation, Silting, Freshwater fish, Tagging methodology, *Stream fisheries, *Diversity index, Evenness, *Index of change.

A new method for measuring structural change in sets of species which have been subjected to natu-

ral or exprimental perturbation is developed and is shown to be superior to static diversity and evenness measures for this purpose. Three parameters, are shown to provide necessary and sufficient information on the severity of a perturbation as well as the uniformity of its effect on all species in the set. When positive and negative changes in species abundance are considered separately, the method is sensitive to compensatory changes which are not detected by static measures. The parameters are then calculated for some data sets on polluted and unpolluted fish communities in second and third order streams from the Clemons Fork watershed in eastern Kentucky. Results indicate that the diversity of change over two sampling seasons is high for perturbed and unperturbed systems, but the evenness of change is lower for the communities which were polluted in the second sampling season. Several pollution results in the suppression of most major fish species, whereas more moderate pollution results in a large number of compensatory changes. The biological basis for such an outcome is discussed, and the notion of these three parameters as the 'vital signs' of a healthy ecosystem is presented. (Katz)

5C. Effects Of Pollution

A REPORT ON THE CONCENTRATION, DISTRIBUTION AND IMPACT OF CERTAIN TRACE METALS FROM SEWAGE TREATMENT PLANS ON THE CHESAPEAKE BAY, Chesapeake Research Consortium, Inc., Annapolis, MD.

For primary bibliographic entry see Field 5B. W79-02511

DETERMINATION OF THE PRACTICAL VALUE OF TOXIC LOADINGS.

VALUE OF TOXIC LOADINGS, British Columbia Research Council, Vancouver. Canadian Environmental Protection Service, Ottawa, Ontario K1A 1C8, Cooperative Pollution Abatement Research (CPAR) Project Report 588-1, April, 1977, 38 p. 2 fig, 6 ref, 11 tab.

Descriptors: *Pulp wastes, *Toxicity, Acid streams, Alkaline water, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Canada, Foreign countries, Effluents, Waste water(Pollution), Mixing.

The additive nature and mixing patterns of toxic loadings in alkaline and acid sewers of bleached kraft mills were investigated at two British Colum-bia locations (Powell River and Harmac) of Mac-Millan Bloedel Ltd. Results indicated that the toxicity of different process streams making up the individual acid and alkaline sewers is additive when expressed in terms of toxicity emission rates or toxic loadings per ton of pulp. On the other hand, when the acid and alkaline sewers were combined into total mill effluent, their toxicities were less than additive. The procedure by which the two streams were mixed did not have any effect on the combined effluent's toxicity. (Brown-IPC) W79-02536

WATER QUALITY ASSESSMENT MODEL - OXYGEN DYNAMICS MODEL FOR LOW-FLOW STREAMS, Civil and Environmental Engineering Development Office, Tyndall AFB, FL. For primary bibliographic entry see Field 5B. W79-02579

SUPPLEMENT TO 'EFFECTS OF THERMAL DISCHARGES ON PHYSICO-CHEMICAL PROCESSES AND WATER QUALITY' VISTULA RIVER, POLAND, Institute of Meteorology and Water Management, Warrany (Poland)

Warsaw (Poland). J. R. Doilido.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 580, Price codes: A08 in paper copy, A01 in microfiche.

Group 5C-Effects Of Pollution

Environmental Protection Agency, Report EPA 600/3-77-074b, November, 1977, 147 p, 130 tab, 6

Descriptors: *Thermal effects, *Water temperature, On-site-investigation, Water pollution effects, Streams, Electric power, *Thermal pollution, Thermal power, Thermal powerplants, *Thermal water monitoring, Cooling water, *Particle size, Sediments, Chemical analysis, Water quality, *Vistula River, Poland, Kozienice Power Plant.

The study on the influence of thermal water dis-charge from the open cooling system of the Ko-zienice power plant on the thermal regimes and water quality of the Vistula River was carried out water quanty of the Vistuia River was carried out in the period from January 1973 to December 1975. The plant, situated at the 425th km of the Vistula River, first started in November 1972. Con-struction was finished in February 1975 with 1600 MWe capacity. Studies carried out downstream of the plant included: (1) expedition type of survey, the temperature and velocity distributions in chosen cross-sections of the river and in the outlet channel were done. (2) periodical type of survey. The temperature and velocity distribution in the The temperature and velocity distribution in the cross-section 1000 m downstream of the discharge and in the outlet channel. (3) everyday observations of the temperature in the three cross-sections at three points in each both banks and midstream at 7 a.m., 12 noon and 6 p.m. Special investigations were performed using a Coulter Counter to determine the influence of thermal water discharge on the number and size distribution of suspended particles in Vistula water. This report contains basic data collected in these studies and a section on Precision of Analytical Methods. (EIS-Katz)

CONCENTRATIONS OF TEN HEAVY METALS IN SOME SELECTED LAKE POWELL GAME FISHES, New Mexico Univ., Alburguerque. Dept. of Biol-

For primary bibliographic entry see Field 5B.

AN ASSESSMENT OF THE OCCURRENCE OF HUMAN VIRUSES IN LONG ISLAND AQUAT-IC SYSTEMS.

Brookhaven National Lab., Upton, NY. J. M. Vaughn, and E. F. Landry. Report BNL 50787 130 p., 1977. 29 fig, 45 tab, 106

Descriptors: *Viruses, *Public health, *Sewage treatment, Human pathology, Human diseases, Chlorination, Municipal wastes, Water analysis, Sewage effluents, Waste water disposal, Pollutant identification, Secondary treatment, Tertiary treatment, ment, *Poliovirus, *Enteroviruses

The survey involved the concentration, enumera-tion, and identification of human enteroviruses from selected aquatic systems on Long Island in-cluding embayments, lakes, creeks, public drinking water supplies, groundwater influenced by wastewater recharge, sanitary landfills, and storm-water recharge basins; and the effluents from secondary and tertiary sewage treatment plants. En-teroviruses were isolated from all systems studied ercoviruses were isolated from all systems studied except the public water supply wells. As expected, viruses were most often encountered in the chlorinated effluents of sewage treatment plants. On two separate occasions, wild type Poliovirus was isolated from one of these plants. (EIS-Deal) W79-02584

THE USE OF POTASSIUM PERMANGANATE (KMNO4) IN FISHERIES; A LITERATURE REVIEW.

Fish and Wildlife Service, Fayetteville, AR. South Central Reservoir Investigations.
For primary bibliographic entry see Field 5G.
W79-02585

SENSITIVITY OF MACROCYSTIS GAMETO-PHYTES TO COPPER,

California Univ., Livermore, Lawrence Livermore

B. M. Smith, and F. L. Harrison. Lawrence Livermore Laboratory, Technical Information Department, UCRL-52481, 38 p, 1978. 16 fig, 22 tab, 51 ref.

Descriptors: *Copper, *Kelps, *Toxicity, Bioassay, Growth stages, Growth rates, Plant growth, Plant physiology, Resistance, Reproduction, Biological membranes, Water chemistry, Water analysis, Chemical analysis, *Macrocystis, Gametophytes.

Gametophytes of giant kelp, Macrocystis pyrifera, were exposed to copper in a dish-culture bioassay system. Through their development into gametophytes, newly released spores were exposed continuously to various concentrations of copper to determine its effect on vegetative growth. In addition, gametophytes of different ages were exposed continuously to copper to determine the sensitivity of several developmental stages to copper and the effect of copper on the production of gametes. A one-week pulsed-exposure experiment was performed to determine the recovery period for vegetative growth. Complete inhibition of growth occurred when gametophytes were exposed continuously to copper concentrations of 500 ppb or more. Vegetative growth was inhibited significantly by continuous exposure to 50 ppb copper. (EIS-Deal) W79-02586

THE EFFECT OF ARSENIC ON THE THER-MAL TOLERANCE AND SURVIVAL OF NEWLY HATCHED MUSKELLUNGE FRY (ESOX MASQUINONGY), State Univ. of New York at Buffalo. Dept. of

Master's Thesis, Department of Biology, State University of New York at Buffalo, 35 p, 1976. 11 fig, 8 tab, 37 ref.

Descriptors: *Resistance, *Water temperature, *Pikes, *Sodium arsenite, Arsenic compounds, Toxicity, Mortality, Fish physiology, Fry, Water pollution effects, Herbicides, Pesticide toxicity, Pesticide residues, Water quality, Bioassay, *Arsenic, Thermal pollution.

Newly hatched muskellunge fry were raised in tanks containing 0.00, 0.05, 1.0 and 5.0 ppm arsenic as sodium arsenite at a temperature of 15C (+ or -0.5C) and a photoperiod of 12 hours of light alternating with 12 hours of dark. Temperature tolerance of fry, Critical Thermal Maximum, (CTM), was significantly reduced by exposure to arsenic. Fry raised at arsenic concentrations of 0.05 ppm or greater suffered 100% mortality during or shortly after swim-up. Control fry had a sharp drop in CTM during swim-up, became active feeders and continued to develop normally. (EIS-Deal) W79-02587

DIVERSITY AS A MEASURE OF BENTHIC MACROINVERTEBRATE COMMUNITY RESPONSE TO WATER POLLUTION, State Univ. of New York Coll. at Oneonta. Dept.

of Biology. P. J. Godfrey.

Hydrobiologia, Vol. 57, No. 2, p 111-122, 1978. 4 fig, 5 tab, 36 ref. OWRT B-004-MASS(8), 14-01-0001-1510.

Descriptors: *Bioindicators, *Stream pollution, *Benthic fauna, *Aquatic invertebrates, Water pollution effects, *Diversity indices.

The assumption that water pollution causes a depression in the diversity of benthic macroinvertebrates as measured by the Shannon index and similar diversity indices is questioned. An interpretation of the community response of benthic macroinvertebrates to pollution in the Millers River, Massachusetts is dealered for procession server. Massachusetts is developed from species presence-absence and abundance data in conjunction with published information on the species' environmen-tal tolerances as compared to chemical water qual-ity data. This interpretation is compared with one derived solely from diversity index values. The

interpretations are quite different; the differences may be attributed to other environmental factors such as impoundments and flow reduction which influence the fauna and thus the diversity index value, but which are not related to pollution. In addition, several intrinsic features of the diversity indices increase their bias.

W79-02595

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AVIAN COMMUNITIES AND HABITAT COM-PONENTS IN NATURAL AND WASTEWATER-IRRIGATED ENVIRONMENTS,

Pennsylvania State Univ., University Park. For primary bibliographic entry see Field 5G. W79-02601

METHODOLOGY DEVELOPED FOR ASSESSMENT OF FISH AND MACROINVERTE-BRATE COMMUNITIES IN THE NEW RIVER,

Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Botany. C. H. Hocutt.

Available from Univ Microfilms International, Ann Arbor, MI 48106; Order No. 74-23,811. PhD Thesis, 1974. 189 p.

Descriptors: *Aquatic populations, *Invertebrates, *Sampling, *Rotenone, *Benthic fauna, *Thermal pollution, *Statistical methods, *Analytical techniques, *Methodology, *Fish, Water pollution effects, Water pollution sources, Heated water, Biological communities, Stress, Environmental effects, *Shaerotilus natans, *New River(Virginia).

Techniques developed or refined for collecting and evaluating fish and macroinvertebrate data from the New River, Virginia, are reported. These methods were developed to allow accurate ecological assessment of large river systems. Techniques were refined for sampling fish by rotenone and macroinvertebrates by artificial substrates. Chemical and biological data indicated that Celanese had a local effect on New River due to high discharge temperatures. (Katz) W79-02606

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. INTERIM SYNTHESIS: BEAUFORT/CHUKCHI.

National Oceanic and Atmospheric Administra-tion, Boulder, CO. Outer Continental Shelf Envi-ronmental Assessment Program. NOAA/ERL/OCSEAP, Arctic Project Office, Interim Synthesis Report: Beaufort/Chukchi, August 1978. 369 p.

Descriptors: *Water pollution effects, *Resources development, *Baseline studies, *Oil pollution, *Environmental effects, Aquatic live, Arctic, Cold regions, Ice, *Outer Continental Shelf, Beaufort Sea, Chukchi Sea, Petroleum development.

Twelve baseline studies are compiled providing information on: The Sea Ice Environment; Physical Oceanography and Meteorology; Earth Sciences; Marine Mammals; Birds; Marine Biota; Chemistry and Microbiology; Species, Habitats and Processes Sensitive to OCS Development; Trophic Interactions; Probable Impacts and Consequences of Oil Development; Effects of Gravel mining and Construction of Gravel Islands and Causeways; and Environmental Hazards to Offshore Operations of the Beaufort and the Chukchi Seas before the development of petroleum and related resources were undertaken. (See W79-02609 thru W79-02613) (Sinha-OEIS)

SPECIES, HABITATS AND PROCESSES SENSITIVE TO OCS DEVELOPMENT,

Environmental Research Lab., Fairbank, AK.
Arctic Project Office.

Arctic Project Office.
In: Environmental Assessment of the Alaskan Continental Shelf. Interim Synthesis Report: Beaufort/Chukchi. Part II, Interdisciplinary Aspects of Likely OCS Impacts, August 1978. p 251-267, fig, 1 tab. P. Connors, (ed.).

Effects Of Pollution—Group 5C

Descriptors: *Resources development, *Water pol-lution effects, *Environmental effects, *Aquatic life, Habitats, Ecosystems, Baseline studies, Alaska, *Outer Continental Shelf, *Environmental assess-ment, Petroleum development, Beaufort Sea.

The Alaskan Beaufort seacoast is a mosaic of marine, shoreline and tundra habitats distributed over a length of several hundred kilometers. Some habitats, such as saltmarsh, are very important to wildlife and are easily damaged by OCS development, but are limited in areal extent and are dispersed in many small patches along the coast. Different sensitivity ratings are assigned to a list of habitats and the seasonal variations in sensitivity within each habitat is noted. Under the separate discussion of key biota, species are listed which merit special attention in research and management. These are chosen for a variety of reasons, including high population concentrations along the Beaufort coast, vulnerability to potential disturbances such as oil spills, scarcity in North America, or importance to humans for subsistence use. See also W79-02608. (Sinha-OEIS). W70.02600

TROPHIC INTERACTIONS.

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TROPHIC INTERACTIONS.
Environmental Research Lab., Fairbanks, AK.
Arctic Project Office.
In: Environmental Assessment of the Alaskan Continental Shelf Interim Synthesis Report: Beaufort/Chuchi. Part II, Interdisciplinary Aspects Olikely OCS Impacts, August 1978. p 268-287, 33 ref. Frost, K. (ed.).

Descriptors: *Environmental effects, *Trophic level, *Ecosystems, *Arctic, Alaska, Oil spills, Water quality control, Baseline studies, *Outer Continental Shelf, Trophic interactions, Petroleum development, Beaufort Sea.

The trophic interactions of the food web in the Beaufort Sea and the potential environmental impacts of petroleum exploration and development on this ecosystem are examined. Not only are arctic organisms different from temperate ones, but so is the behavior of oil in cold arctic waters, and in the presence of ice. Identification of key species and important species interdependencies will make it easier to develop predictive models or to assess ecological effects. Trophic studies are a means of ordering and simplifying systems, of reducing them from lists of hundreds of species of smaller sets of key species and interactions. The study of trophic interactions within a system can identify potential differential sensitivity of parts of the system, evaluate which times or places or species appear to be most or least vulnerable, and make recommendations as to how to minimize potential detrimental effects of OCS development. (See also W79-02608) (Sinha-OEIS) W79-02610

PROBABLE IMPACTS AND CONSEQUENCES OF OIL DEVELOPMENT, Environmental Research Lab., Fairbanks, AK. Arctic Project Office.

Arctic Project Office.
In: Environmental Assessment of the Alaskan Continental Shelf Interim Synthesis Report: Beaufort/Chukchi. Part II, Interdisciplinary Aspects of Likely OCS Impacts, August 1978. p 288-320, 36 ref. Burns, J. J. (ed.).

Descriptors: *Habitats, *Biota, *Oil spills, *Arctic, Alaska, Baseline studies, Environmental effects, Cold regions, *Outer Continental Shelf, *Environ-mental impact, Beaufort Sea, Petroleum develop-

Two sections, one on sensitive species and habitats and another on trophic interactions, have been singled out for separate discussion. The object was to reexamine and reevaluate predictions of the possible consequences of hypothetical situations which would probably occur during development of the Beaufort Sea. This working group was concerned with attempting to recognize and discuss those species, geographical areas and habitats considered to be sensitive or critical. Thus, if a species of animal is considered sensitive, its sensitivity is to

oil spills, disturbance, dislocation or other impacts generated by the processes of exploration, development or production of gas and oil fields. The animal could be adversely affected while the capability of its habitat to support that animal remains essentially unchanged. Sensitive areas' are considered to be those in which biological productivity is relatively high and which would probably be adversely impacted by major disturbances, particularly oil spills. Adverse impacts in a significant portion of a sensitive area would result in a 'critical impact' to one or more species of plant or animal. (See also W79-02608) (Sinha-OEIS)

EFFECTS OF GRAVEL MINING AND CONSTRUCTION OF GRAVEL ISLANDS AND CAUSEWAYS.

Environmental Research Lab., Fairbanks, AK. Arctic Project Office.

In: Environmental Assessment of the Alaskan Continental Shelf Interim Synthesis Report: Beaufort/Chukchi. Part II, Interdisciplinary Aspects of Likely OCS Impacts, August 1978. p 321-334, 16 ref. Hopkins, D. M. (ed.).

Descriptors: *Resources development, *Mining, *Environmental effects, Gravels, Drilling, Exploration, Arctic, Alaska, Cold regions, Baseline studies, *Outer Continental Shelf, *Artificial islands, Beaufort Sea, Petroleum development, Environmental experience of the control of

With proper design and scheduling, many of the natural islands of the Beaufort Sea could be used for exploratory and developmental drilling and as production sites with low negative environmental consequences. Certain islands (western Cooper, Cross, Duck, and Howe Islands) which are important nesting habitats, should be kept untouched. Historical and archaeological sites should be inventoried and protected before use of the tundracovered Pleistocene islands is permitted. Causeways may cause more serious perturbations of the environment. However, in spite of their disadvantages, a causeway could prove extremely useful in limiting the dispersal of oil during a major spill event. Dismantling and removal of artificial islands and causeways may create as much environmental and causeways may create as much environmental disturbance and involve at least as much cost as the original construction. Biota may have become de-pendent on the causeways and artificial islands and serious consideration should be given to leaving in place those structures that do not pose serious hazards to navigation, with or without their slope protection. A few artificial islands and causeways protection. A few artificial islands and causeways can be constructed in appropriate places without severe adverse consequences, but the lacing of the 1979 lease area with multiple artificial islands, stabilized natural islands, and interconnecting causeways could have disastrous cumulative effects upon the biota of this arctic region. (See also W79-0209) (Single CRES) 02608) (Sinha-OEIS) W79-02612

ENVIRONMENTAL HAZARDS TO OFF-SHORE OPERATIONS.

Environmental Research Lab., Fairbanks, AK. Arctic Project Office.

Arctic Project Office.
In: Environmental Assessment of the Alaskan Continental Shelf Interim Synthesis Report: Beaufort/Chukchi. Part II, Interdisciplinary Aspects of Likely OCS Impacts, August 1978. p 335-362, 1 fig. Weeks, W.F. (ed.).

Descriptors: *Resources development, *Hazards, *Cold regions, *Offshore platforms, Environmental effects, Baseline studies, Alaska, Ice, *Outer Continental Shelf, Beaufort Sea, Petroleum development, Environmental assessment.

A number of areas have been discussed in which the environment can have a significant impact on offshore operations along the Beaufort Sea coast. If the nature of the environmental hazard is underif the nature of the environmental nazard is under-stood and incorporated into the initial design and subsequent operation of a system, safe and efficient operation can certainly be achieved although at times the price will be high. The Beaufort Sea is a frontier area in the sense that many of the environ-

mental problems encountered there, in particular those associated with the presence of ice, are different from the problems that are usually encountered in petroleum development of an ice-free coast. There is, however, operation experience that has been gained in other areas where ice is common, such as the Canadian Arctic and Cook Inlet, and it is directly applicable to the Beaufort Sea coast. Good design for this challenging region will definitely require a thorough knowledge of environmental hazards and sea ice mechanics coupled with solid inventive engineering. (See also W79-02608) (Sinha-OEIS) W79-02613

EFFECTS OF BUNKER C OIL AND AN OIL DISPERSANT: PART 2-EFFECTS ON THE ACCUMULATION OF CHLORINE-LABELLED BUNKER C OIL IN VARIOUS FISH TISSUES, Simon Fraser Univ., Brunaby. (British Columbia). Dept. of Biological Sciences.

B. A. McKeown, and G. L. March.

Marine Environmental Research, Vol 1, No 2, p
119-123, October 1978. 1 fig, 9 ref.

Descriptors: *Water pollution effects, *Oil pollution, Fish, Environmental effects, Laboratory tests, *Outer Continental Shelf, *Bunker C oil, Dispersants, Hydrecarbons.

Chlorine-labelled Bunker C oil was used to measure the differential accumulation in various fish tissues between a hydrocarbon and a hydrocarbon/oil dispersant mixture. There is an increased movement of the emulsified oil across the gill structure although accumulation by this tissue is similar for both test conditions. The liver and kidney showed significantly higher levels of the oil/dispersant mixture whereas muscle accumulations were less tramatic. The amounts of Bunker C found in the gills, liver and kidney were considerably higher than that found in the muscle. Consideration was given to the varying capability of the blood to carry polar, compared with non-polar, compounds. (Sinha-OEIS) W79-02620

EXPERIMENTS WITH LITTORINA SPECIES TO DETERMINE THE RELEVANCY OF OIL SPILL DATA FROM SOUTHERN CALIFORNIA TO THE GULF OF ALASKA, University of Southern California, Los Angeles. Inst. for Marine and Coastal Studies. D. Straughan, and D. Hadley. Marine Environmental Research, Vol 1, no 2, p 135-163, October 1978. 12 fig, 9 tab, 18 ref.

Descriptors: *Oil spills, *Toxicity, *Mortality, *Water pollution effects, Environmental effects, Alaska, Canada, California, Laboratory tests, Temperature, *Outer Continental Shelf, Littorina scutulata, Littorina sitkana, Petroleum, Gasoline.

Littorina scutulata were collected from Alaska, Canada and southern California and L. sitkana were collected from Alaska and Canada. These animals were exposed to a range of petroleums at a range of temperatures. Gasoline was the most toxic of all compounds tested. Six degrees C and 29C temperatures both during and prior to experiments temperatures both during and prior to experiments had a greater influence on survival and attachment rates a week after exposure to petroleum than did the different types of petroleum. The temperature influence can be related to both zoogeographical distribution and seasonal temperatures. Data obtained in the Santa Barbara Channel can be extrapolated to the Gulf of Alaska when differences such as temperature tolerance and type of oil are considered for the same and closely related species. Attachment rates and mortality rates changed after the animals were removed from petroleum. This suggests a weakness in standard toxicity testing procedures when mortality rates are compared immediately after removal from test solutions. (Sinha -OEIS) OEIS)

W79-02621

CULTURING AND ECOLOGY STUDIES OF THE ROTIFER POLYARTHRA VULGARIS,

Group 5C-Effects Of Pollution

Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
A. L. Bukema, J. Cairns, Jr., P. C. Edmunds, and T. H. Krakauer.

T. H. Krakauer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 587, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Report EPA 600/3-71-051 August 1977. 53 p, 16 tab, 7 fig, 91

Descriptors: *Zooplankton, *Methodology, *Ro-tifers, *Laboratory tests, Laboratory equipment, Oxygen, Vitamins, Animals, Fish food organisms, Water temperature, Stress, Oxygen, Animal growth, Animal diseases, Animal physiology, Reproduction, Animal population, Chlorophyll, *Polyarthra vulgaris.

The results contained in this report represent re-search conducted to identify variables which affect the survival and reproduction of the rotifer, Po-lyarthra vulgaris. The following variables were studied: handling stress, container size, frequency of changing the culture medium, light quantity and of changing the culture medium, light quantity and quality, photoperiod, oxygen and vitamin requirements, fungal parasites, food preference and concentration, antibioic effects of bluegreen algae, and temperature. Temperature had an effect on population dynamics, percent of females with eggs, number of eggs per female, and sexual reproduction. Egg production rates were estimated and observations on the duration of egg development were made. This report also includes a field study of the relation between Polyarthra vulgaris and 19 selected chemical and physical parameters. [E18. selected chemical and physical parameters. (EIS-Katz)

W79-02624

DESIGN AND EVALUATION OF LABORATORY ECOLOGICAL SYSTEM STUDIES. Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.

C. E. Warren, and W. J. Liss.

C. E. warren, and W. J. Liss. Available from the National Technical Information Service, Springfield, VA 22161 as PB-280 051, Price codes: A07 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Re-search Series, Report EPA 600/3-77-022, Decem-ber 1977, 116 p, 1 tab, 31 fig, 51 ref.

Descriptors: *Toxicity, *Bioassay, *Mathematical models, Environment, Ecology, Aquatic biology, *Aquatic populations, *Laboratory tests, Water pollution, Water pollution effects, Laboratory equipment, Microcosms, Biological systems, Laboratory ecological systems. Toxicant effects. *Theoretical analysis, Environmental toxicology, Bioas-

Design and evaluation of laboratory ecological system studies are considered in relation to problems and objectives in environmental toxicology. Ecological systems are defined to be organismic systems together with their level-specific, co-ex-tensive environmental systems and to occur at individual, population, and multispecies levels of biological organization. So that the basis for judgbiological organization. So that the basis for judg-ments on the relevance and adequacy of laboratory ecological system studies for solution of problems in nevironmental toxicology will be clear, a con-ceptual framework defining with abstract general-izations the nature of biological systems is present-ed and employed. And a graphical calculus is used to deduce isocline systems and dynamic as well as steady-state behaviors of multisecies systems as a sesteady-state behaviors of multispecies systms, so as to illustrate the importance of empirical evaluation of the capacities, not simply the performances, of laboratory ecological systems. Within the context of apparent toxicological problems and this conceptual framework, the relevance and adequacy of laboratory ecological system studies on toxicant effects and behaviors are evaluated. ((EIS-Katz) W79-02625

FEASIBILITY OF USING BACTERIAL STRAINS (MUTAGENESIS) TO TEST FOR EN-VIRONMENTAL CARCINOGENS, Houston Univ., TX. Dept. of Biology. J. E. Evans

Available from the National Technical Information Service, Springfield, VA 22161 as PB-281 672, Price codes: A07 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA-600/3-78-042, 118 p, April 1978. 7 tab, 79 ref, 4 append.

Descriptors: *Toxicity, *Bacteria, *Chemical wastes, Industrial wastes, Chemicals, Organic compounds, Hazards, Animal pathology, Human pathology, Bioassay, Physicochemical properties, E. coli, Salmonella, Aromatic compounds, Dyes, Laboratory tests, Path of pollutants, Bioindicators, *Mutagens, *Carciongens.

A rapidly growing store of data is available relative to the potential mutagenicity and carcinogenicity of new products of chemical substances manufactured for commerce in recent years. Literature regarding mixtures, such as chemical wastes, however, is scarce and hard to find. A literature review was undertaken to assess feasibility of using bacteria as screening agents to detect environmental carcinogens. Mutagenicity data were included in the study because growing experimental evidence indicates that most chemical carcinogens are mutagens, and many mutagens may be carcinogens. This investigation found that bacterial mutagenesis can be used to initiate a series of studies designed to screen for potential mutagens and carcinogens in mixed chemical wastes. (EIS-Deal) W79-02626

BIOLOGICAL AVAILABILITY OF POLLUT-ANTS TO MARINE ORGANISMS,

Center for Energy and Environment Research, Mayaguez, Puerto Rico.
J. R. Montgomery, M. Price, J. Thurston, G. L. de Castro, and L. L. Cruz.
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Castro, and L. L. Cruz. Available from the National Technical Information Service, Springfield, VA 22161 as PB-281 187, Price codes: A07 in paper copy, A01 in microfiche Environmental Protection Agency, Report EPA-600/3-78-035, 145 p, March 1978. 43 fig, 4 tab, 38

Descriptors: *Trophic level, *Food webs, *Sewage sludge, *Sludge disposal, Cadmium, Chromium, Copper, Nickel, Lead, Zinc, *Heavy metals, Clams, Oysters, Snails, Sewage disposal, Path of pollutants, Public health, Absorption, *Sea urchin, Thalassia, *Sea cucumber, *Mangrove, Tissue analysis, Bioaccumulation.

This research was initiated to determine the rates of uptake, by a Thalassia testudinum ecosystem, of Cd. Cr. Cu. Ni. Pb. and Zn which were leached Cd, Cr, Cu, Ni, Pb, and Zn which were leached from sewage sludge by seawater. Organisms utilized in the study were: clam; oyster; snail; sea cucumber; uchin; turtle grass; and red mangrove. In general, the net uptake pathways followed the trophic levels in the food webs. The authors concluded that the dumping of sewage sludge in shallow, tropical marine environments could lead to high concentrations of toxic metals inorganisms used as food by man. (EIS-Deal) W79-02628

AQUATIC FIELD SURVEYS AT HOLSTON ARMY AMMUNITION PLANT, KINGSPORT TENNESSEE, FINAL REPORT, Water and Air Research, Inc., Gainesville, FL. J. H. Sullivan, Jr., H. D. Putnam, M. A. Keirn, D. R. Swift, and B. C. Pruitt, Jr. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 627, Price codes: A12 in paper copy, A01 in microfiche. Army Research and Development Command, Contract No. DAMD-17-75-C-5049, 267 p, June 1977. 48 fig. 20 tab. 81 ref. 4 append. 1977. 48 fig, 20 tab, 81 ref, 4 append.

Descriptors: *Chemical wastes, *Toxicity, *Peri-phyton, *Explosives, Aquatic life, Aquatic envi-ronment, Biomass, Aquatic algae, Effluents, Tro-phic levels, Eutrophication, Biological communi-ties, Water quality, Water analysis, Nutrients, *Munitions effluents.

Overall effects of munitions effluents were most clearly observed in the periphytic community and

were confined to the vicinity of the waste outfalls. Marked increases in heterotrophic biomass and reduction in autotrophic populations were noted. Species compositions shifts among the diatoms growing on artificial substrates suggested toxic manifestations from munitions related effluents. Effects on the periphyton were observed in water containing as little as 20 microg/l RDX. Direct relationship of RDX residues to biotic response in this system must be discharge, upstream waste inputs, and flow variability make it virtually impossible to closely quantify typical conditions at a given station. (EIS-Deal)

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CHRONIC TOXICITY OF CHLORDANE, TRI-FLURALIN, AND PENTACHLOROPHENOL TO SHEEPSHEAD MINNOWS (CYPRINODON

EG and G, Bionomics, Pensacola, FL. Marine Research Lab.

P. R. Parrish, E. E. Dyar, J. M. Enov, and W. G.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 269, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Re-search Series, Report EPA-600/3-78-010, 53 p, January 1978. 35 tab, 51 ref, append.

Descriptors: *Toxicity, *Mortality, *Minnows, Pesticides, Pesticide toxicity, Pesticide residues, Organic compounds, Fish physiology, Life history studies, Life cycles, Growth rates, Growth stages, Embryonic growth stage, Fecundities, Fish reproduction, Bioasasys, *Toxicity testing, *Chlordane, *Trifluralin, *Pentachlorophenol.

Sheepshead minnows were exposed to three chemicals-chlordane, trifluralin, or pentachlorophenol-in flowing, natural seawater to determine acute and chronic (full life-cycle effects). Mortality of parental fish exposed to mean measured chlordane concentrations greater than or equal to 2.8 microg/1 was significantly greater than that of control fish. Exposure to mean measured trifluralin in concentrations of greater than or equal to 9.6 microg/1 significantly decreased growth of parental fish. Mortality of parental sheepshead minnows exposed to mean measured pentachlorophenol concentrations greater than 88 microgl was significantly greater than mortality of control fish. Estimates of the maximum acceptable toxicant concentration of each chemical were provided. (EIS-Deal) W79-02631

SUBSTITUTE CHEMICAL PROGRAM - INITIAL SCIENTIFIC AND MINIECONOMIC REVIEW OF METHYL PARATHION.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 840, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-540/1-75-005, 176 p, February 1975. 4 fig, 29 tab, 45 ref.

Descriptors: *Pesticides, *Pesticide toxicity, *Pesticide kinetics, Pesticide residues, Organic pesticides, Toxicity, Organic compounds, Path of pollutants, Chemical properties, Persistence, Costbenefit analysis, *Methyl parathion, Substitute Chemical Persistence, Persistence, Costbenefit analysis, *Methyl parathion, Substitute Chemical Persistence, Persistence, Costbenical Persistence, Costbe chemical program.

Methyl parathion was reviewed for suitability as a substitute chemical for more environmentally dangerous pesticides. The substitute chemical was analyzed in reference to its chemistry, toxicology, pharmacology, and environmental fate and movement, and socioeconomic factors such as use patterns, costs and benefits. (EIS-Deal) W79-02633

CHEMICAL AND BIOLOGICAL SURVEY OF LIBERTY BAY, WASHINGTON, Environmental Protection Agency, Seattle, WA. Surveillance and Analysis Div. J. M. Cummins, R. R. Bauer, R. H. Rieck, W. B. Schmidt, and J. R. Yearsley.

Effects Of Pollution—Group 5C

Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 256, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-910/9-76-029, 132 p, September 1976. 32 fig, 22 tab, 59 ref, 2 append.

Descriptors: *Mercury, *Water quality, *Toxicity, *Oysters, Water pollution sources, Water pollution effects, Embryonic growth stage, Sediments, Metals, Industrial wastes, Domestic wastes, Water quality control, Water quality standards, Commercial shellfish, Cadmium, Chromium, Nickel, Mortality, Animal diseases, *Washington, *Tissue analysis, *Liberty Bay(Wash).

This report summarizes an investigation into the possible causative factors for high oyster mortality in Liberty Bay, Washington. Levels of heavy metals and other possible toxicants in seawater, wastes, sediments, fish and shellfish from regional waters were determined. Sources of pollutants were located and recommendations for improvement were presented. (EIS-Deal)

PREIMPOUNDMENT STUDY LITTLE BLACK CREEK DRAINAGE BASN BLACK CREEK WA-TERSHED BULLOCH COUNTY, GEORGIA,

TERSHED BULLOCH COUNTY, GEORGIA, Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div. H. C. Vick, D. W. Hill, H. A. True, R. J. Brunner, III, and T. O. Bramwell, Jr. Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 310, Price codes: A06 in paper copy, A01 in microfiche. Report EPA 904/9-77-026, August 1977. 74 p, 20 for 11 tab. 6 ann. 29 ref. fig, 11 tab, 6 app, 29 ref.

Descriptors: *Water quality, Impoundments, *Pre-impoundment, *Multiple-purpose reservoirs, Res-ervoir sites, Water analysis, Water chemistry, Nu-trients, Eutrophication, Coliforms, Pathogenic bac-teria, Domestic wastes, Biochemical oxygen demand, Dissolved oxygen, Watersheds(Basins), *Drainage basins, *Georgia, *Black Creek Watershed(Geo), Bulloch County(Geo).

Water quality studies were performed on this drainage basin to determine preimpoundment conditions and predict the effects of the project. It was concluded that: (1) a dissolved oxygen deficiency would be created; (2) the degree of eutrophication experienced would depend upon the control of nutrient sources; and, (3) fecal coliform levels should decrease sufficiently to allow recreational swimming. (EIS-Deal)

EFFECTS OF CHANNELIZATION OF THE LUXAPALILA RIVER ON FISH, AQUATIC IN-VERTEBRATES, WATER QUALITY AND FUR-BEARERS.

Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.

D. H. Arner, H. R. Robinette, J. E. Frasier, and M.

D. H. Arner, H. R. Robinette, J. E. Prasier, and M. H. Gray.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 507, Price codes: A04 in paper copy, A01 in microfiche. Department of the Interior, Fish and Wildlife Service, Office of Biological Services, Report No. FWS/OBS-76-08, June 1976. 58 p, 8 fig, 27 tab, 24

Descriptors: *Channel improvement, *Channels, *Dredging, Environmental effects, Productivity, Water quality, Turbidity, Plankton, Channeling, Benthic fauna, Fish populations, Sewage effluents, Bass, Channel catfish, Channel flow, Furbearers, Beavers, *Species diversity, Muskrats.

Biological data collected from July 1973 to January 1976 from an old channelized segment (over 52 years), an unchannelized segment, and a newly channelized segment of the Luxapalila River, Mississippi, and Alabama, revealed that productivity of the old channelized segment has not recovered to the levels exhibited in the unchannelized segment. There were no evident differences in water quality between the three segments except for

higher turbidity trends in the newly channelized segment. The number of plankton organisms was higher in the newly channelized segment, possibly due to influence of sewage. Diversity of plankton, macroinvertebrates, and fish was greater in the unchannelized segment than in the channelized segments. The average number/sample of fish and macroinvertebrates was significantly higher in the unchannelized segment. Muskrat and beaver, the species not commonly associated with an aquatic habitat, were far more numerous in the unchannelized segment than in either the old or newly channelized segments. (EIS-Deal) W70-02636

PROBLEM DEFINITION STUDIES ON PO-TENTIAL ENVIRONMENTAL POLLUTANTS, IV: PHYSICAL, CHEMICAL, TOXICOLOGI-CAL, AND BIOLOGICAL PROPERTIES OF BENZENE; TOLUENE; XYLENES; AND P-CHLOROPHENYL METHYL SULFIDE, SUL-FOXIDE, AND SULFONE.

FOXIDE, AND SULFONE.
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5G.
W79-02637.

FATE OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN THE ENVIRONMENT: SUMMARY AND DECONTAMINATION REC-OMMENDATIONS,

Air Force Academy, CO. Dept. of Chemistry and Biological Sciences. For primary bibliographic entry see Field 5B. W79-02639

USE OF COMMENSAL PROTOZOA AS BIO-LOGICAL INDICATORS OF WATER QUALITY

Wayne State Univ., Detroit, MI. Dept. of Biology. G. A. Antipa.

G. A. Antipa. Transactions of the American Microscopical Society, Vol 96, No 4 p 482-489, 1977. 3 fig, 22 ref. OWRT A-015-ILL(2).

Descriptors: *Bioindicators, *Indicators, *Proto-zoa, Infection, *Mollusks, Water pollution effects, Water quality, Endocommensal molluscan ciliated protozoa

Commensal ciliated protozoa of fresh-water bi-valve molluscs were tested for their ability to detect conditions of organic pollution within a small midwestern stream. Data are presented which demonstrate that one of these ciliates, He-terocinetopsis unionidarum, responds rapidly to unfavorable conditions. The further development of sensitive biological indicators and their potential to warn of impending and possibly irreversible environmental change are discussed. W79-02643

THE EFFECT OF HYPOLIMNION RESERVOIR RELEASES ON FISH DISTRIBUTION AND SPECIES DIVERSITY,
Texas Univ. at Austin. Dept. of Zoology.
For primary bibliographic entry see Field 6G.
W79-02670

SATELLITE OBSERVATIONS OF CALCIUM CARBONATE PRECIPITATIONS IN THE GREAT LAKES,

Environmental Satellite Service, Wash-For primary bibliographic entry see Field 7B. W79-02685

LAKE PROCESS MODELS APPLIED TO RES-ERVOIR MANAGEMENT,

URS Corp., San Mateo, CA. For primary bibliographic entry see Field 5A. W79-02716

AN ECOLOGICAL STUDY OF EPIPSAMMIC DIATOMS FROM SEDIMENTS ASSOCIATED

WITH JUNCUS ROEMERIANUS IN A NORTHWEST FLORIDA SALT MARSH, Florida State Univ., Tallahassee. Dept. of Biological Science.

For primary bibliographic entry see Field 2L. W79-02722

THE SALT MARSH VEGETATION OF CHINA POOT BAY, ALASKA,
Rutgers - The State Univ., Newark, NJ. Dept. of

For primary bibliographic entry see Field 2L. W79-02744

EFFECTS OF GRASS CARP INTRODUCTION ON MACROPHYTIC VEGETATION AND CHLOROPHYLL CONTENT OF PHYTO-PLANKTON IN FOUR FLORIDA LAKES,

Florida State Game and Freshwater Fish Commission, Lake Wales. For primary bibliographic entry see Field 2H. W79-02758

PLANT BIOMASS AND NET PRIMARY PRODUCTION ALONG A FLOOD-FREQUENCY GRADIENT IN THE STREAMSIDE FOREST, Illinois Univ. at Urbana-Champaign. Dept. of For-

For primary bibliographic entry see Field 2I. W79-02761

ENVIRONMENTAL PARAMETERS OF THE TENNESSEE RIVER IN ALABAMA: II, PHYSICAL, CHEMICAL, AND BIOLOGICAL PARAMETERS,

Alabama Univ., in Huntsville. School of Graduate Studies and Research. For primary bibliographic entry see Field 5A.

W79-02781

DETOXIFICATION OF METALS BY MARINE BIVALVES: AN ULTRASTRUCTURAL STUDY OF THE COMPARTMENTATION OF COPPER AND ZINC IN THE OYSTER OSTREA EDULIS,

Institute of Marine Biochemistry, Aberdeen (Scot-For primary bibliographic entry see Field 5A. W79-02784

THE EFFECTS OF THREE PHTHALATE ESTERS ON THE LARVAL DEVELOPMENT OF THE GRASS SHRIMP PALAEMONETES PUGIO (HOLTHUIS),

Texas A and M Univ., College Station. Dept. of

Biology. R. B. Lauhglin, Jr., J. M. Neff, H. R. Hrung, T. C. Goodwin, and C. S. Giam. Water, Air, and Soil Pollution, Vol. 9, p 323-336, 1978. 4 fig, 3 tab, 32 ref.

Descriptors: *Shrimp, *Toxicity, *Growth stages. *Growth rates, *Larval growth stage, *Animal metabolism, *Bioassay, *Mortality, *Animal physiology, *Absorption, Crustaceans, Organic compounds, Water pollution effects, *Esters, Phthalate esters, *Zoeae, Palaemonetes, *Tissue.

The effects of three phthalic acid esters, dimethyl phthalate (DMP) di-n-butyl phthalate (DEP), and di-2-ethylhexyl (DEHP) on survival and development rate of larvae of the grass shrimp were investigated. Only 100 ppm DMP and 10 to 50 ppm DMP were acutely toxic to the larvae. DMP at a concentration of 100 ppm significantly increased the duration of larval development to the first postlarval stage. DEHP concentrations up to 1 ppm (the solubility limit of this ester) were without effect on either survival or development rate of the ppm (the solution) mind on development rate of the larvae. Phthalate esters were not detectable at or above the 2 ppm level in the tissues of larvae chronically exposed to phthalates for the duration of larval development, suggesting active metabolism of phthalates by this species. (EIS-Deal) W79-02786

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W. B.

Group 5C-Effects Of Pollution

HAZARDOUS WASTE DISPOSAL DAMAGE REPORTS, DOCUMENT NO. 3.

Environmental Protection Agency, Washington, DC. Office of Solid Waste Management Programs. For primary bibliographic entry see Field 5E. W79-02792

STABILITY OF HUMAN ENTEROVIRUSES IN ESTUARINE AND MARINE WATERS,

Maryland Univ., College Park. Dept. of Microbi-

For primary bibliographic entry see Field 5B. W79-02803

DENITRIFICATION IN A MASSACHUSETTS SALT MARSH

SALT MARSH,
Boston Univ., MA. Dept. of Biology.
For primary bibliographic entry see Field 5A. W79-02812

SEICHE STRUCTURE AND VERTICAL MIXING BELOW THE EPILIMNION IN SMALL LAKES,

Michigan Univ., Ann Arbor. Div. of Biological

P. Kilham, J. P. Adams, and B. D. LaZerte.

P. Kilham, J. P. Adams, and B. D. LaZerte. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 400, Price codes: A09 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, East Lansing, Project Completion Report, Jan, 1979. 198 p. 47 fig. 6 tab, 47 ref, append. OWRT A-094-MICH(1), 14-34-0001-7048.

Descriptors: "Seiche structure, "Planktonic dia-toms, Internal seiche structure, Seasonal shifts, Currents, Lakes, "Michigan, "Vertical stratifica-tion, "Spatial stratification, Epilimion, Hypolimion, Eutrophication, Turbulent mixing, Cyanophyta, "Frains Lake(Mich), Asterionella formosa, Syne-dra filiformis, Stephanodiscus hantzschii, Water pollution effects, Water pollution control.

The internal seiche structure of Frains Lake, Michigan has several vertical modes during summer stratification. The lowest frequencies have the greatest amplitudes, down to 0.05 cycles per half-hour, with the higher frequencies becoming progressively less dominant. The fundamental vertical internal mode is imperceptible. The phase shifts with depth of the observed vertical harmonics correspond well with those predicted by a ics correspond well with those predicted by a discrete approximation to the continuous density internal wave equations. In addition, seasonal shifts in frequency and phase displacement that follow the seasonal changes in the temperature profile were predicted and observed. Currents in the hypolimnion are primarily driven by internal seiches. The major conclusion is that hypolimnion region of small lakes can be turbulently mixed by currents primarily driven by internal seiches. This impor-tant observation should be of use in the prediction and management of algal blooms. Vertical nutrient and management of algal blooms. Vertical nutrient flux from the hypolimnion can be a major source of nutrients that sustain meta- and epilimnetic blooms of noxious blue-green algae. In addition, turbulent mixing of the hypolimnion increases steepness of the diffusion gradients between the sediments and the bottom water and the hypolimnion and the epilimnion. As a result vertical nutri-ent flux will be greater in small lakes with turbulent hypolimnia.

FIELD ESTIMATES OF AQUATIC PLANT RESPIRATION AND ITS APPLICATION OF STREAM DISSOLVED OXYGEN BUDGETS, Pennsylvania State Univ., University Park. Dept. of Civil Engineering.

A. J. McDonnell.

A. J. McDonnell.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 333,
Price codes: A03 in paper copy, A01 in microfiche.
Pennsylvaia State University Research Project
Technical Completion Report, December 1978. 41
p, 9 fig. 8 tab, 41 ref. OWRT B-026-PA(1), 14-31-0001-3123.

Descriptors: *Eutrophication, Aquatic plants, *Natural streams, Plant populations, Streams, *Dissolved oxygen, *Respiration, Reaeration, Lowh, flow, Energy dissipation, *Aquatic plant growth, *Stream oxygen budget, Oxygen consumption, Dissolved oxygen concentration, Plant communi-

Daily measurements of dissolved oxygen variations were made throughout a calendar year on three separate segments of a stream subjected to aquatic plant growth. Mass balance budgets, quantifying respective sources and sinks of dissolved oxygen for the study segments, demonstrated the validity of incorporating an aquatic plant respiration pattern which varied in direct proportion to dissolved oxygen concentration. The effects of oxygen consumption by the plant population on field estimates of reaeration, daily gross primary productivity, community respiration and maximum net primary productivity in the budgeting process are evaluated. (Sink-Penn State) ed. (Sink-Penn State) W79-02816

PARASITES AND RELATED PATHOLOGY OF THE COTTONTAIL RABBIT (SYLVILAGUS FLORIDANUS) IN CENTRAL PENNSYLVA-

Pennsylvania State Univ., University Park. Dept. of Veternary Science.

J. P. Wiggins. J. P. Wiggins.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 422,
Price codes: A06 in paper copy, A01 in microfiche.
PhD Dissertation, November, 1977. 101 p. 2 fig. 12
tab, 118 ref. OWRT B-084-PA(4), 14-34-0001-6113.

Descriptors: *Seasonal, *Pennsylvania, *Animal pathology, *Animal parasites, Parasitism, *Cottontail rabbit, *Coccidiosis, *Helminth infection, Trapping season, Trap site, Liver, Lung, Spleen, Skeletal muscle, Body weight, Hematoloty, Red

Over three years, 131 cottontail rabbits were examined for parasites and associated pathology after necropsy. The numbers of oocysts and helminth necropsy. The numbers of oocysts and neimintan ova were unaffected by sex, age, trap site, trapping season, or year. Resuls indicate that differences in coccidiosis and helminth infection determined by the number of parasite species infecting the host animal are affected by year with a possibility of seasonal influence on coccidiosis. Gastro-intesseasonal influence on coccidiosis. Gastro-intestional pathology was affected by sex for stomach lining; intestinal sections were affected by age, year, and trap site. Liver, lung, spleen, skeletal muscle, and Sarcocystis leporum infection scores were also influenced by one or more of the factors considered, while pathology of adrenals, brain, heart, and kidney were unaffected. Correlations of parasite data and body weights, measurements, hematology, and blood chemistry indicated that cocidiosis affects the hody size of the host-halmoth cidiosis affects the body size of the host; helminth infections affect the blood parameters by decreasing red blood cell counts and compensation by the host. This research verifies that parasitism by coccidia and helminths is normal in cottontails and at the present time levels do not appear to severely interfere with host health. (Sink-Penn State)

A PRELIMINARY INVESTIGATION OF THE PHOSPHORUS LOADING CHARACTERISTICS OF LAKE CARNEGIE, PRINCETON, NEW JERSEY,

Rutgers - The State Univ., New Brunswick, NJ. Dept. of Chemical and Biochemical Engineering. For primary bibliographic entry see Field 3B. W79-02835

TOXICITY OF BOG WATER TO EMBRYONIC AND LARVAL ANURAN AMPHIBIANS,

The Pennsylvania State Univ., University Park. P. A. Saber.

P. A. Saoer.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 434, Price codes: A03 in paper copy, A01 in microfiche. MS Thesis, August 1977. 28 p. 2 fig, 6 tab, 39 ref. OWRT A-042-PA(4), 14-34-0001-6039.

Descriptors: *Amphibians, *Bogs, *Acidic water, Hydrogen ion concentration, *Toxicity, Larvae, Water pollution effects, *Anuran larvae, Embryo, Bullfrog, Clawed frog, Low pH.

Bullfrog, Clawed frog, Low pH.

A survey of the amphibians of a north temperate zone bog revealed that a number of species common in suitable locations nearby were absent from the bog. Several species of anuran larvae and embryos suffered high mortality when placed in the naturally acidic stream draining the bog. Mortality of bullfrog larvae (Rana catesbeiana) placed at a number of sites along the natural pH gradient (pH 3.9-6.6) formed by this stream was significantly greater than in those placed in a clearwater control stream (pH 6.6-6.9). This lethality of stream water even at moderate pH's near 6.0 indicates that a toxic factor other than acidity may be involved. In the laboratory, mortality of clawed frog (Xenopus laevis) embryos was significantly greater in unaltered bog water (pH 4.0-4.3) than in bog water neutralized with sodium hydroxide or in charcoal filtered tap water. The latter two conditions did not show significant mortality differences. This implies that low pH is the principal source of toxicity for Xenopus. (Sink-Penn State) W79-02837

EFFECTS OF TEMPERATURE ON GROWTH CONSTANTS OF SELENASTRUM CAPRI-CORTNUTUM,

Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.

J. H. Reynolds, E. J. Middlebrooks, D. B. Porcella, and W. J. Grenney.

Journal of Water Pollution Control Federation, Vol. 47, No. 10 p 2420-2436, October 1975. 7 fig, 10 tab, 27 ref. OWRT B-070-UTAH(7), 14-01-10 tab, 27

Descriptors: Algae, *Growth, Kinetics, *Selenastrum capricornutum, *Temperature.

The alga Selenastrum capricornutum (Printz) has been specified for use in bioassays by the Environmental Protection Agency. Continuous-flow (chemostat) experiments conducted at 20 degrees, 24 degrees, 27 degrees, 28 degrees, and 33 degrees C indicated that S. capricornutum exhibits luxury uptake of ammonium-nitrogen. The luxury uptake of ammonium-nitrogen. The luxury uptake of the organism may be described by either a first-order or a hyperbolic function. The nutrient utilization constants for both luxury uptake functions have a maximum value of 3.16 and 2.46 days, respectively, at 24 degrees C. The constants decrease as the temperature is increased or decreased from 24 degrees. The maximum specific growth rates of the organism at 20 degrees, 24 degrees, 27 degrees, 28 degrees, and 33 degrees C are, respectively, 1.365, 1.992, 1.412, 1.390, and 1.274 days, the maximum occurring between 24 degrees and 27 degrees C. The value of the ammonium-nitrogen half-saturation constant was constant between 20 degrees and 33 degrees C, with an average value of 5.356 microg/1 NH4-N. W79-02876

USE OF HISTOLOGIC AND HISTOCHEMICAL ASSESSMENTS IN THE PROGNOSIS OF THE EFFECTS OF AQUATIC POLLUTANTS, Louisville Univ., KY. School of Medicine.

D. E. Hinton, M. W. Kendall, and B. B. Silver.

In: Biological Methods for the Assessment of Water Quality. American Society for Testing and Materials, Special Technical Publication No. 528, p 194-208, 1973, 23 fig, 30 ref. OWRT A-038-KY(4), 14-31-0001-3517.

Descriptors: Water pollution effects, Fish physiology, *Channel catfish, Methylmercuric chloride, Pollutant identification, *Histology, *Histochemistry, Histopathology, Cytochemistry

Application of histologic and histochemical techniques to the determination of effects of aquatic pollutants upon fish tissues is discussed. Definition of terms and techniques associated with appropri-ate preparation of tissue specimens are given. Illus-trations include examples from control and altered tissues. A summary of work with methyl mercuric chlor Huff

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chloride in channel catfish illustrates the use of both techniques in assessing the prognosis of the effects of aquatic pollutants upon fish tissues. (Huffsoy-Kentucky) W79-02877

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GROWTH MUDEL USING BATCH CALL OF ANY AND ATA,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
T. Lederman, C. Hornberger, and G.G. Kelly.
Water, Air and Soil Pollution, Vol 5 p 431-442,
1976. 7 tab, 31 ref.

Descriptors: *Model studies, *Eutrophication, Lakes, Digital computers, Calibration, *Phyto-plankton, *Predictive model, Testing, Evaluation, Ecological changes.

The feasibility of applying nonlinear parameter estimation techniques to data from batch culture of phytoplankton is studied using simulated data. A Monod-type model for nutrient uptake and growth in phytoplankton is used for the simulation. A parameter estimation procedure is applied to these data before and after they are noise-corrupted, to obtain back-calculated values of the parameter in the model. The results indicate that nonlinear parameter estimation is well suited for analytical interpretation of batch-culture data.

W79-02878

PRODUCTIVITY OF OSPREYS IN CONNECTI-CUT-LONG ISLAND INCREASES AS DDE RESIDUE DECLINES, Cornell Univ. Ithaca, NY. Section of Ecology and

Systematics. P. R. Spitzer, R. W. Risenbrough, W. Walker, II, R. Hernandez, and A. Poole. Science, Vol. 202, p 333-335, 1978. 1 fig, 1 tab, 24 ref.

Descriptors: *DDE, *Pesticide residues, *Pesticide toxicity, *Dieldrin, *Fecundity, Animal physiology, Animal pathology, Animal metabolism, *Polychlorinated biphenyls, Mercury, Non-Game birds, Birds, Chlorinated hydrocarbon pesticides, Reproduction, Pesticide kinetics, Path of pollutants, Toxicity, Productivity, *Osprey, Tissue analysis, *Bioaccumulation.

Nesting success of ospreys breeding in the Connecticut-Long Island area has increased since 1973 and is now approaching the levels recorded prior to the 1950's. Simultaneously, DDE and dieldrin residues have declined in unhatched eggs. Levels of polychlorinated biphenyls have shown no changes over the period 1969 to 1976. The increase in productivity is attributed primarily to lower levels of DDE contamination. Detrimental effects in the past on ospreys in the Connecticut River estuary are attributable to local contamination with dieldrin. (EIS-Deal)

TRACE METALS IN SOME FISH SPECIES OF SOUTH CAROLINA,

South Carolina State Coll., Orangeburg. Dept. of Natural Sciences For primary bibliographic entry see Field 5A. W79-02887

CADMIUM AND ZINC CONTENT OF FISH FROM AN INDUSTRIALLY CONTAMINATED LAKE,

Purdue Univ., Lafayette. IN. Dept. of Bionucleon-

For primary bibliographic entry see Field 5A. W79-02888

TOXICITY-, ACCUMULATION-, AND ELIMINATION STUDIES OF ALPHA-HEXACHLOROCYCLOHEXANE (ALPHA-HCH) WITH SALTWATER ORGANISMS OF DIFFERENT TROPHIC LEVELS, Rijksinstituut voor de Volksgezondheid, Bilthoven

(Netherlands). Lab. for Toxicology. J. H. Canton, R. C. C. Wegman, J. A. Vulton, C. H. Verhoef, and G. J. Van Esch. Water Research, Vol. 12, p 687-690, 1978. 4 fig, 4 tab, 3 ref.

Descriptors: *Toxicity, *Brine shrimp, Organic compounds, Path of pollutants, Trophic level, Marine algae, Crustaceans, Fish physiology, Animal metabolism, Chemical analysis, Chemical properties, Growth rates, Salinity, Bioassay, Montalities, Chlorinated hydrocarbons, Hexachlorocyclohexane, *Bioaccumulation, Tissue analysis, *Lebistes, Guppies, Artemia, Brine shrimp, Dunaliella.

A short-term study with alpha-HCH was carried out with saltwater organisms of different trophic levels: the alga Dunaliella, the crustacean Artemia, and the fish Lebistes, acclimated to water of gradually increased salinity. Within the solubility range of alpha-HCH in saltwater, there was no influence on the growth of Dunaliella. The LC50 (4 days) on the growth of Dunaliella. The LC50 (4 days) for Artemia was 0.5 mg 1-1. In the longterm study the LC50 (35 days) for Lebistes proved to be 0.5 mg 1-1. In the accumulation studies the concentration factor was about 60-90 with Artemia and about 500 with Lebistes. Equilibrium levels were reached within 24 and 48 h respectively. In the elimination studies the alpha-HCH concentration was halved within 48-72 h in Artemia and within 10 h in Lebistes. (EIS-Deal) W79-02889

LES OLIGOCHETES D'UN COURS D'EAU MONTAGNARD POLLUE: LE BIEF ROUGE (THE OLIGOCHAETES OF A POLLUTED

MOUNTAIN STREAM: THE BIEF ROUGE), Centre Technique du Genie Rural des Eaux et des Forets, Paris (France). Centre d'Hydroecologie.

M. Lafont. Annales de Limnologie, vol. 13, no. 2, p 157-167, 1977. 3fig., 2tab., 22ref.

Descriptors: *Oligochaetes, *Waste water(Pollution), *Effluents, *Worms, Annelids, Invertebrates, Distribution patterns, Aquatic life, Benthic fauna, Bioindicators, Streams, Water quality, Environmental effects, Speciation, Succession, Population, Indicators, *Bief Rouge(France).

The effects of organic wastes on the oligochaetes of the Bief Rouge were shown by the development of 3 species that were prolific to the detriment of other oligochaetes: x I. tubifex, N. elinguis, S. heringianus (and to a certain degree, N. comnunis). In contrast, neither L. hoffmeisteri or L. udekemianus attained high densities. The results indicated the usefulness of oligochaetes as bioindicators of water quality. It appeared that associations of pollution-resistant species varied depending upon the type of flowing water and the level of contamination. (EIS-Klein)

UTILISATION DU PROTOZOAIRE CILIE COLPIDIUM CAMPYLUM POUR LA MESURE DE LA TOXICITE ET DE L'ACCUMULATION DES MICROPOLLUTANT: ANALYSE CRITIQUE ET APPLICATIONS (USE OF THE CILIATED PROTOZOA COLPIDIUM CAMPYLUM FOR THE MEASUREMENT OF TOXICITY AND ACCUMULATION OF MICROPOLLUTANTS: ANALYSIS AND APPLICATION), Lesting Destry L'US (Ford).

Institut Pasteur, Lille (France). Ecotoxicologie Microbienne Inst.

D. Dive, and H. Leclerc.

Environmental Pollution, Vol. 14, p. 169-186, 1977. 9 fig, 7 tab, 13 ref. (In French with English abstract).

Descriptors: *Toxicity, *Methodology, *Protozoa, Toxicants, Research and Development, Population, Growth rates, Bioassay, Microorganisms, Invertebrates, Water quality, Mortality, Lethal limit, Analytical techniques, Waste water(Pollution), *Polychlorinated biphenyl, Arsenic compounds, Mercury, Zinc, Cadmium, Copper, Lead, Phenols, Alcohols, *Bioaccumulation, Colpidium campylum Cyanides. lum, Cyanides.

A previously described method using C. campy-lum for toxicity bioassays was analyzed after two year's use. Dispersion of mean start populations and detection threshold of Coulter Counter R used for counts affected accuracy and reproducibility of results. The method was used to measure the mini-mal toxic dose of 17 water-soluble toxic substances. The method of use for direct toxicant determina-tion of tap and drinking water, sewage, and indus-trial waste waters was discussed. Among sub-stances tested were polychlorinated biphenyls, Ar-senic, Mercury, Zinc, Cadmium, Copper, Lead, Cyanide, Phenol, and Ethanol. (EIS-Klein)

ACTIONS ECOTOXICOLOGIQUES DE CERTAINS METAUX (CU-ZN-PB-CD) CHEZ LES POISSONS DULCAQUICOLES DE LA RIVIERE LOT (THE ECOTOXICOLOGICAL ACTION OF SOME METALS (CU-ZN-PB-CD) ON FRESHWATER FISH IN THE LOT RIVER, Cole National Superieure Agronomique de Tou-louse (France). Lab. de Ichtyologie Appliquee. R. Labat, C. Roqueplo, J. M. Ricard, P. Lim, and M. Burgat.

Annales de Limnologie, vol. 13, no. 2, p 191-207, 1977. 6 fig, 9 tab, 18 ref.

Descriptors: *Freshwater fish, *Water quality, *Metals, *Toxicity, *Copper, *Zinc, *Lead, *Cadmium, Absorption, Sampling, Fish physiology, Path of pollutants. Biological membranes, Analytical techniques, *Lot River(France), Tissue analysis, Bioaccumulation.

Contamination of 15 species of fish by the heavy metals Cu, Zn, Pb and Cd was most evident at stations downstream from pollution sources on the Lot River. The fish tissues exhibited passive accumulation of the metals related to the metal concentrations in the water. There was thought to be 3 critical thresholds of metals in the water, each one affecting different physiological processes. Metal contamination affected passive absorption through the gills and food absorption against a gradient through the gut. (EIS-Klein)

UNTERSUCHUNGEN ZUR INTENSIVHAL-TUNG VON FISCHEN IM WARM-WASSERK-REISLAUF (STUDIES REGARDING INTENSI-FIED FISH CULTURE IN A CLOSED WARM WATER SYSTEM),

(West Germany). Inst. fuer Kuesten- und Binnen-fischerei.

L. Nagel, C. Meske, and K. Mudrack. Archiv fur Fischwissenschaft, Vol. 27 (1), 1976, p 9-23. 7 fig, 42 ref.

Descriptors: *Aquiculture, *Carp, Fish establishment, Fish farming, Fish physiology, Growth rates, *Nitrates, Nitrites, Waste water treatment, Waste water disposal, Laboratory tests, Microbial degradation, Microbiology, Oxidation, Sludge, Sludge disposal, Nitrogen compounds, *Controlled denitrification, *Bacterial nitrification, Microbial denitrification.

The possibility to treat waste water in a closed warm water system (60 m3) for intensified fish culture by activated sludge without reaching toxic substrate levels for carp during a period of more than three years (July 1972-December 1975) could be shown. Despite the high concentrations of nitrate (to 1800 mg NO3/1) a continuous weight increase of fish could be gained. The inclusion of a special denitrification tank resulted a controlled reduction of the nitrate to free nitrogen, and a decrease of the nitrate concentration to 200 mg decrease of the nitrate concentration to 200 mg NO3/1. Due to the removal of excess sludge and the loss of water by evaporation and overspill a daily addition of about 2% fresh water was necessary. W79-02896

BENZO(A)PYRENE MONOOXYGENASE IN-DUCTION IN MARINE FISH -MOLECULAR RESPONSE TO OIL POLLUTION,

Group 5C-Effects Of Pollution

Institut Rudjer-Boskovic, Rovinj (Yugoslavia). Lab. for Marine Molecular Biology. B. Kurelec, S. Britaric, M. Rijavec, and W. E. G.

Marine Biology, Vol. 44, 1977, p 211-216. 1 tab, 3

Descriptors: *Marine fish, Monitoring, Oil, Oil pollution, *Water pollution effects, Path of pollutants, Animal metabolism, Animal biochemistry. Fish physiology, *Oil spills, Fish physiology, Benthic fauna, Laboratory tests, On-site-investigations, *Benzo(a)pyrene monoxygenase, Blenniideae, Blennius pavo, *Diesel fuel, *No. 2 fuel oil, Sardines, Northern Adriatic, Fish livers, *Molecu-

Induction of benzo(a)pyrene monooxygenase (BPMO) activity occurred in Blennius pavo, a species with a restricted territorial range, in re-sponse of exposure to a Diesel 2 oil. A response sponse of exposure to a Diesel 2 oil. A response delay of 14 days was found at a concentration of 170 ppb and of 3 days when the water was saturated with Diesel 2 oil. When induced fish wert ransferred to clean water, elevated BPMO x activity was maintained at a high level for at least a month. A benthic protochordate, Microcosmo sulcatus, showed no increase in BPMO activity when exposed to these concentrations even after 20 days of xposure. Field observations revealed 30 days of exposure. Field observations revealed a great variation in the BPMO activity from B. pavo great variation in the Brand activity from 5. pavo caught at different sites. Fish from contaminated sites had significantly elevated levels of BPMO activity. Sardine schools caught at different sites had different, low levels of BPMO activities. However, specimens from the same school had closely similar levels of enzyme activity. Measurement of BPMO activity in the livers of non-migrant fish could serve as a useful biochemical parameter for monitoring and evaluation of acute or long-term oil pollution at a given site. (EIS-Katz)

POOLS OF NITROGEN IN A GEORGIA SALT MARSH.

Georgia Univ., Athens. A. G. Chalmers. PhD Dissertation, 1977. 162 p.

Descriptors: *Salt marshes, *Georgia, *Nitrogen, Wetlands, Marshes, Tidal marshes, Nitrites, Nitrates, Soil gases, Ammonia, Salinity, Marsh plants, Nitrogen cycles, Turnovers, Sludge

Seasonal variations were studied of the standing stocks of exchangeable ammonium, nitrite, nitrate, total nitrogen, and salinity in soils and total nitrogen in plants in both the high and low marsh with gen in plants in both the high and low marsh with respect to soil nitrogen. However, annual accumulation in aboveground biomass of Spartina alteniflora was 9.84 g N/sq m in the low marsh and 4.69 g N/sq in the high marsh, suggesting the existence of additional inputs of N or more rapid turnover of soil N in the low marsh. Based on estimates of annual flux of N to S. alterniflora and standing took of explaneable ammonium turnover time. stock of exchangeable ammonium, turnover times of inorganic N were calculated, ranging from 6-20 days for the high marsh and 3-6 days for the low marsh. Addition of sludge to short S. alterniflora marsh resulted in higher total N concentrations in the top 5 cm of the soil, in higher NH4(+) concentrations, and increased S. alterniflora biomass. Salinities in the sludge-amended areas were higher than in unfertilized areas probably due to increased transpirations. (Steiner-Mass)

ARSENIC EXCRETION BY MONKEYS DOSED WITH ARSENIC-CONTAINING FISH OR WITH INORGANIC ARSENIC,

Health and Welfare Canada, Ottawa (Ontario). Toxicology Research Div.

S. M. Charbonneau, K. Spencer, F. Bryce, and E. Sandi.

Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 4, p 470-477, 1978. 2 tab,

Descriptors: *Animal metabolism, *Arsenic compounds, Path of pollutants, Animal physiology, Mammals, Chemical analysis, Chemical properties, Digestion, Metabolism, Inorganic compounds, Public health, Commercial fish, *Arsenic.

Four female Cynomolagus monkeys were given single oral doses of fish arsenic. 67% of the arsenic was excreted in the urine and 10% with the feces, essentially within 5 days post exposure. The same monkeys were later dosed with inorganic arsenic, and 76% of it was excreted with the urine and practically none with the feces. (EIS-Deal) W79-02901

FATE AND EFFECTS OF CRUDE OIL SPILLED ON PERMAFROST TERRAIN. FIRST

YEAR PROGRESS REPORT, Army terrestrial Sciences Center, Hanover, NH. For primary bibliographic entry see Field 5B. W79-02902

THE POTENTIAL AND REALIZED INFLU-ENCES OF TEMPERATURE ON THE DISTRI-BUTION OF FISHES IN THE NEW RIVER, GLEN LYN, VIRGINIA, Virginia Polytechnic Inst. and State Univ., Blacks-

burg. Center for Environmental Studies.
J. R. Stauffer, Jr., K. L. Dickson, J. Cairns, Jr., and

D. S. Cherry.

The Journal of Wildlife Management, Supplement No. 50, 40 p, November 1976. 24 fig. 5 tab, 69 ref.

Descriptors: *Water temperature, *Fish behavior, *Fish physiology, Animal behavior, Habitats, Channel catfish, Bass, Suckers, Shiners, Darters, Statistical methods, Mathematical studies, Virginia, *Multivariate analysis, *New River(Va), Glen

Temperature preference and avoidance data for several fish species on which there was previously little or no information were provided. The importance of studying the effects of environmental rameters of each species on a site specific basis was demonstrated. The application of multivariate screening techniques to in situ fish allowed the influence of temperature with respect to other variables to be evaluated. (EIS-Deal)

APPLICATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY TO THE STUDY OF DISSOLVED ORGANIC PHOS-PHORUS COMPOUNDS RELEASED BY

Tennessee Univ., Knoxville. Dept. of Civil Engineering. For primary bibliographic entry see Field 5A W79-02906

CHROMATOGRAPHIC STUDIES OF DIS-SOLVED ORGANIC PHOSPHORUS COM-POUNDS RESULTING FROM ALGAL CUL-TURES,

Tennessee Univ., Knoxville. Dept. of Civil Engineering. For primary bibliographic entry see Field 5A.

DETRITUS AS FOOD FOR ESTUARINE COPE-

Maryland Univ., Solomons. Chesapeake Biological Lab. For primary bibliographic entry see Field 2L. W79-02916

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK BIGHT, FIRST AND SECOND MONITORING CRUISES, NOVEMBER 1975 AND MARCH

CRUISES, NOVEMBER 1976, National Oceanic and Atmospheric Administra-tion, Boulder, CO. Marine Ecosystems Analysis Program Office. J. Caracciolo, J. Pearce, M. Halsey, and L. Rogers. NOAA Data Report ERL MESA-40, September 1978. 51 p. 1 fig, 9 ref, append.

Descriptors: "Benthos, "Water pollution effects, "Baseline studies, Ecosystems, Environmental effects, Monitoring, Distribution, "Outer Continental Shelf, "New York Bight.

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Analyses of benthic communities have been used since 1968 to indicate impacts from contaminants on the ecosystem of the New York Bight apex. This data report is a product of the fourth phase, monitoring of selected stations in the apex, and was prepared to provide machine listed data and certain statistical calculations, diversity and equitability concerned with the distribution and abundance of benthic organisms collected at 18 monitoring stations located in the standard New York Bight MESA sampling grid. Data from these stations will yield information on changes in the Bight over time by providing more replicate samples which may be compared with earlier samples collected at the same stations. Moreover, these stations also form the basis for sampling strata 4 of the new NMFS Ocean Pulse environmental assessment program. (NOAA)

SUBLETHAL EFFECTS OF TREATED LIQUID EFFLUENT FROM A PETROLEUM REFINERY ON FRESHWATER ORGANISMS,

Sprague (J. B.) Associates Ltd., Guelph (Ontario). J. B. Sprague, D. W. Rowe, G. F. Westlake, T. A. Heming, and I. T. Brown.

Petroleum Assoc. for Conservation of the Canadian Environment; Petroleum and Industrial Organic Chemical Div., Water Pollution Control Directorate, EPS, Fisheries and Environment Canada, Ottawa, Canada, October, 1978, 297 p., 53 ref., Addendum A, Addendum B.

Descriptors: *Liquid wastes, Oil industry, Aquatic animals, *Waste disposal, Effluents, Daphnia, Rainbow trout, Sampling, Testing, Treatment, Growth rates, Respiration, Reproduction, *Lethal limit, Application methods, Assay, *Oil pollution, Water pollution effects, *Oil wastes, *Canada, *Flagfish.

Sublethal tests used twice-weekly samples of treated liquid effluent from a petroleum refinery. The tests were conducted using rainbow trout, small ropical flagfish and Daphnia pulex as the organisms. Over two years, 71 of 94 effluent samples met federal guidelines for non-lethality to trout. Six specified physico-chemical characteristics had average values within or near federal guidelines. Sublethal experiments were based on non-lethal samples of effluent. Growth of rainbow trout was severely affected at 30% concentration of effluent, and threshold for effect was judged to be close to 10%. For growth, survival, and reproduction of the small tropical flagfish, the threshold was similar, at about 9%. Trout did not show any obvious avoidance reactions up to 30% effluent. However, their general locomotor activity increased at 10% and decreased sharply at 30%. Respiratory rate of trout was not significantly changed at 50% effluent, but increased at 100%. Coughing increased linearly with concentration with a threshold of significant change between 25 and 50% effluent. Daphnia pulex were killed in two days by 76% effluent and were 2.5 times as sensitive as trout. The 'safe' concentration, which would not significantly affect reproduction of Daphnia, was estimated to be 0.52%. (WATDOC) W79-02929 Sublethal tests used twice-weekly samples of treat-W79-02929

PLANT STANDING CROP AND PRODUCTIV-ITY RELATIONS IN A SCIRPUS-EQUISTUM WETLAND,

McGill Univ., Montreal (Quebec). Dept. of Biol-For primary bibliographic entry see Field 21. W79-02936

THE RELATIONSHIP BETWEEN NET PRI-MARY PRODUCTION AND ACCUMULATION FOR A PEATLAND IN SOUTHEASTERN FOR A PEATLAND IN SOUTHEAS MANITOBA, Manitoba Univ., Winnipeg. Dept. of Botany. R. J. Reader, and J. M. Stewart.

Effects Of Pollution—Group 5C

Ecology, Vol. 53, No. 6, p. 1024-1037, Autumn, 1972. 5 fig. 5 tab, 29 ref.

Descriptors: *Peat, *Decomposing organic matter, *Primary productivity, Litter, Wetlands, Accumulation, *Canada, *Manitoba.

Two functional attributes of an ecosystem, net primary production and subsequent dry matter accumulation, were examined in four peatland types (lagg, bog, muskeg and bog forest) located in southeastern Manitoba. A preliminary peat accumulation budget was constructed by relating the amount of litter present after a single year of decomposition to the initial litter income and annual net primary production. Annual litter income in the four vegetation zones ranged from 489 gm/sq m to 1,750 gm/sq m, which represented 69% to 90% of the calculated net primary production. Decomposition losses in the following year amounted to approximately one quarter of the original income. An average annual accumulation rate of 26 gm/sq m/year to 51 gm/sq m/year was calculated from radiocarbon-dated peat cores, thus suggesting that less than 10% of the annual net primary production will remain as peat. (Stihler-Mass) W79-02938

NUTRIENT-PHYTOPLANKTON RELATION-SHIPS IN THE HOLLAND MARSH, ONTAR-IO,

Guelph Univ. (Ontario), Dept. of Zoology. K. H. Nicholls.

Ecological Monographs, Vol. 46, No. 2, p. 179-199, Spring, 1976. 13 fig, 3 tab, 100 ref.

Descriptors: *Marshes, *Phytoplankton, *Nutrients, Biomass, Chlorophyll, Nitrogen, Phosphorus, Diatoms, Fresh water marshes, Wetlands, *Canada, Holland Marsh(Ont).

Over a year, Chlorophyceae comprised one-half, Bacillriophyceae about one-third, and Cyanophyceae less than one-tenth of the standing crop of phytoplankton in the Holland Marsh, Ontario. Diatoms were dominant in the spring and in the fall when the total phytoplankton biomass was as high as 32,000,000 cubic micrometers per ml. Chloro-coccalean forms dominated in summer. Winter coccalean forms dominated in summer. Winter phytoplankton showed more diversity with a considerably lower biomass of 160,000 to 2,900,000 cubic micrometer per ml. Maximumchlorophyll a concentrations of 358 micrograms per liter compare with data from highly eutrophic waters. Chlorophyll a content of the phytoplankton ranged from 0.148 to 1.65% of fresh weight with the value in November exceeding the May value by almost three times. Chlorophyll a contents were lowest in summer, intermediate in spring, and highest in winter when supplies of inorganic nitrogen were ample and daily incident radiation was lowest. Inorganic nitrogen most likely limited summer Inorganic nitrogen most likely limited summer phytoplankton growth. The initial effects of im-proved nutrient retention within intensively cultivated and urban areas on the Holland River water-shed is suggested as a cause of the shift in the limiting nutrient for the spring bloom from silicon dioxide to phosphorus. (Howard-Mass)

OSMOTIC BALANCE AND RESPIRATION IN THE HERMIT CRAB, PAGURUS BERNHARDUS, EXPOSED TO FLUCTUATING SALINI-TIES

Natural Environment Research Council, Bangor (Wales). Marine Invertebrate Zoology Unit.

S. E. Shumway.

Journal of the Marine Biological Association of the United Kingdom, Vol. 58(4), 1978. p 869-876, 1 tab, 5 fig. 11 ref.

Descriptors: "Salinity, "Animal behaviour, Animal metabolism, "Animal physiology, Environmental gradient, "Crustacea, Crabs, Hermit crabs, Pagurus bernhardus, Oxygen, "Oxygen requirements, Laboratory tests, Laboratory equipment, Methodology, "Fluctuating, Salinities, Statistical methods.

Specimens of Pagurus bernhardus (with and with-out shells) were exposed to both gradual (sinusoi-dal) and abrupt (square-wave) salinity fluctuations and changes in haemolyph osmolality, tissue water and analysis in haemolyph osmolality, tissue water content and oxygen consumption monitored. Oxygen consumption was also monitored under steady-state conditions; under these conditions there was no significant difference between the rate of oxygen consumption by animals with shells and animals without shells. During exposure to fluctuating salinities the crabs with shells were seen to increase locomotory activity when the external medium declined to approximately 75% sea water. Haemolymph osmolality values followed the same pattern of change as the external medium; the haemolymph of crabs without shells became significantly more dilute during exposure to low salinity than did that of crabs with shells. Crabs with shells showed a marked temporary increase in oxygen consumption when the external medium declined to approximately 75% sea water; crabs without shells showed no such response. The importance of the shell as a means of protection against dilute media is discussed. (EIS-Katz) W79-02957

ACUMULACION Y EFFECTOS HISTOPATO-LOGICOS DEL MERCURIO INORGANICO Y ORGANICO EN LA LISA (MUGIL AURATUS RISSO) (ACCUMULATION AND HISTOPATH-OLOGICAL EFFECTS OF INORGANIC AND ORGANIC MERCURY ON THE MULLET),

Instituto de Investigaciones Pesqueras, Cadiz (Spain). Lab. de Investigaciones Pesqueras. R. Establier, M. Gutierrez, and A. Arias. Investigacion Pesquera Vol. 42(1), 1978, p 65-80. 2 tab. 1 fig. 10 ref.

Descriptors: Metals, *Mercury, *Methylmercury, *Marine fish, Commercial fish, *Public health, Water pollution effects, Path of pollutants, Accumulation, *Bioaccumulation, Fish diseases, Fish physiology, Anima pathology, Mullets, Bioassay, Histology, Histopathology, DSea water, Laboratory tests.

Accumulation and histopathological effects of organic and inorganic mercury to the lisa, Mugil auratus. Mercury inorganic (HgCl2) and organic mercury (CH3HgCl) uptake by Lisa, Mugil auratus, exposed to 0.1 ppm of Hg(HgCl2) in sea water for 10, 24, 35, 46 and 57 days and 0.008 ppm of Hg (Ch3HgCl) in sea water for 15, 30 and 45 days is studied. Accumulation of mercury in flesh, blood, liver, kidney, spleen, intestine, piloric caeca and gills is determined. The histopathological aspects of this study were undertaken in the hope for a gills is determined. The histopathological aspects of this study were undertaken in the hope for a better knowledge of the effects of the mercury inorganic (HgCl2) on the liver and the intestine and the mercury organic (CH3HgCl) on the gills, stomach (muscular), liver, kidney, and intestine. (EIS-Katz) W79-02958

ACUMULACION AND EFECTOS HISTOPATO-LOGICOS DEL CADMIO Y EL MERCURIO EN EL SAPO (HALOBATRACHUS DIDACTYLUS) (ACCUMULATION AND HISTOPATHOLOGI-CAL EFFECT OF CADMIUM AND OF MER-CURY ON THE SAPO),

Instituto de Investigaciones Pesqueras, Cadiz (Spain). Lab. de Investigaciones Pesqueras. M. Gutierrez, R. Establier, and A. Arias. Investigacion Pesquera, Vol. 42(1), 1978. p 141-154, 1 tab, 7 fig, 13 ref.

Descriptors: *Cadmium, *Mercury, Laboratory tests, *Bioassay, Metals, Water pollution effects, Path of pollutants, Tissue analysis, Fish physiology, Fish pathology, Fish diseases, *Commercial fish, *Public health, Tissue concentrations.

Cadmium and mercury uptake by Sapo, Halobatra-chus didactylus, exposed to 50 ppm of Cadmium in sea water for 4 days and 0.1 ppm of Mercury in sea water for 49 days is studied. Accumulation of cadmium in flesh, blood, liver, kidney and intestine and mercury in flesh and liver is determined. The cytochematological and histopathological speegts of this study were undertaken in the hope for a

better knowledge of the effects of cadmium and mercury on the blood, liver, kidney and intestine. (EIS-Katz)

THE DETECTION OF HEIGHTENED SEA-WATER COPPER CONCENTRATIONS BY THE MUSSEL MYTILUS EDULISI. Natural Environment Research Council, Bangor (Wales). Marine Invertebrate Biology Unit. For primary bibliographic entry see Field 5A. W79-02960

FACTORS CONTROLLING THE AVAILABILITY OF SEDIMENT-BOUND LEAD TO THE ESTUARINE BIVALVE SCROBICULARIA PLANA

Geological Survey, Menlo Park, CA. S. N. Luoma, and G. W. Bryan. Journal of the Marine Biological Assoc. of the United Kingdom, Vol. 38(4) 1978, p 793-802, 2 tab,

Descriptors: Metals, *Lead, Water pollution effects, Sediment, *Iron, *Lead/Iron Ratio, *Molluscs, Animal physiology, *Path of pollutants, Chemical analysis, Clams, Methodology, Estuaries, Biological availability, Southern England Estuaries, Western England, Northwest France, Tissue concentration, Sediments.

Concentrations of lead in the soft tissues of the deposit-feeding bivalve Scrobicularia plana have been compared with the phylochemical characteristics of sediments of 20 estuaries in southern and western England and one in north-west France. The results indicate that the biological availability of lead in the sediment is controlled mainly by the concentration of iron, and that the concentration of lead in the bivalve may be predicted from the Pb/Fe ratio in 1 N hydrochloric acid extracts of surface sediments. (EIS-Katz) W79-02961

INVESTIGATION OF A NUTRIENT-GROWTH MODEL USING A CONTINUOUS CULTURE OF NATURAL PHYTOPLANKTON,

University of Strathclyde, Glasgow (Scotland). Dept. of Applied Microbiology. K. J. Jones, P. Tett, A. C. Wallis, and B. J. B.

Journal of the Marine Biological Association of the United Kingdom, Vol. 58(4) 1978, p. 923-942, 5 tab., 9 fig., 23 ref.

Descriptors: *Phytoplankton, Laboratory tests, *Methodology, *Mathematical models, Biological community, *Nutrients, Phosphorous compound, Algae, Primary production, Nitrogen compounds, Growth chambers, *Growth rates, Chlorophyll,

Phytoplankton from Loch Craran, Argyll was maintained in continous culture for 41 days. During most of this time the mixture of species During most of this time the mixture of species retained the diversity and dominance pattern typical of summer phytoplankton in the loch, notwithstanding the manipulation of algal nutrient status to brong about phosphorus control of growth. Results suggest that most detritus was washed out early in the experiment. Quasi-steady states' with respect to concentration of chlorophyll, particulate carbon (PC), particulate phosphous (PP) and particulate nitrogen (PN), were observed at two levels of input of dissolved inorganic phosphorus. At other times the algal phosphorus quota (estimated from the ratio of PP to PC) varied from about 0,002 to 0.015 atoms P per atom C. Specific growth rate was estimated from the rate of increase of PC. During part of the experiment, growth rate was linearly related to reciprocal phosphorus quota, thus confirming the applicability of the model. (EIS-Katz) W79-02962

SEASONAL PHYTOPLANKTON PRODUC-TION IN THE WESTERN ENGLISH CHAN-NEL 1964-1974,

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Group 5C-Effects Of Pollution

Marine Biological Association of the United King-Marine Biological Association of the United Kingdom, Plymouth (England), Plymouth Lab. G. T. Boalch, D. S. Harbour, and E. I. Butler. Journal of the Marine Biological Association of the United Kingdom, Vol. 58(4), 1978, p 943-954, 5

Descriptors: *Phytoplankton, Marine algae, *Primary productivity, Atlantic Ocean, Carbon radioisotopes, *Methodology, Seasonal, On-site investigation, Carbon cycle diatoms, Dinoflagellates, *English Channel, 14C, Mean seasonal production, *Phytoplankton production, Laboratory equipment, Carbon fixation rates.

Over a period of 10 years, 1964-74, primary production has been measured at three stations across the western English channel using the 14C method. Results for carbon fixation, cell counts and mean seasonal production are illustrated. Statistical analyses show that, at two of the three stations, carbon fixation in 1966 was significantly stations, carbon intation in 1966 was significantly greater than expected and that annual production differs significantly at each of the stations. The variations observed are discussed in relation to other changes recorded in the area during the same period. A deck incubator used for simulated in situ 14C experiments is illustrated. (EIS-Katz) W79-02963

EFFECTS OF TEMPERATURE ON HATCHING SUCCESS AND SURVIVAL OF LARVAE IN THE WHITE BASS,

Environmental Research Lab., Duluth, MN. J. H. McCormick.

The Progressive Fish Culturist, Vol. 40(4), Oct. 1978, p. 133-137, 2 tab., 26 ref.

Descriptors: *Water temperature, Freshwater fish, Boossay, Laboratory tests, Fish eggs, Fish farming, Aquiculture, *White bass, *Juvenile fish, *Fish reproduction, *Mortality, Water pollution effects, Thermal pollution, Thermal stress, Hatching success, Larval survival, Morone chrysops.

Temperature effects on the hatching success of Temperature effects on the natching success of eggs of the white bass (Morone chrysops) were determined by exposing sample lots of recently fertilized eggs to 10 constant temperatures, 6 through 30C. Different lots of eggs were exposed to test temperatures before gastrulation, and after closure of the blastopore in the embryo. The perclosure of the obastopore in the emoryo. The per-centages of normal larvae hatched were not signifi-cantly (P > 0.05) impaired in eggs exposed before gastrulation at temperatures from 18 through 26C, nor in those first exposed after closure of the blastopore at temperatures from 14 through 26C. Eggs incubated at 14C hatched 4.5 days after fertilization, and those incubated at 26C required only I day. The 24 h TL50 for white bass larvae exposed within 24 h of hatching and acclimated to 14, 18, 20, and 26C was between 30 and 32C, and was not altered by the acclimation temperatures tested. (FIS-Katz)

THERMAL RESISTANCE OF RAINBOW TROUT FROM A PERMANENTLY HEATED STREAM, AND OF TWO HATCHERY STRAINS.

Montana State Univ., Bozeman. Dept. of Biology. C. M. Kaya.

The Progressive Fish Culturist, Vol. 40(4), Oct. 1978, p. 138-142, 2 tab., 2 fig., 17 ref.

Resistance times to high temperatures were determined for fingerling and juvenile rainbow trout (Salmo gairdneri) from the Firehole River, Yellowstone National Park, and from the Ennis and Winthrop hatchery strains, after acclimation to 5, 9, 13, 17, 21, and 24.5C. Firehole and hatchery trout acclimated to 21 and 24.5C had similar median resistance times and upper incipient lethal temperatures. After acclimation to the lower temperatures of 5, 9, 13, and 17C. Firehole trout had peratures of 3, 415, and 17C. Firehole trout had nonger median resistance times and slightly higher upper incipient lethal temperatures than did the hatchery trout. The ultimate upper incipient lethal temperature for the Firehole trout and for both hatchery strains was about 26.2C. Rainbow trout

inhabiting and reproducing in the heated waters of the lower Firehole River do not appear to have developed the ability to acclimate to higher tem-peratures. (EIS-Katz) W79-02966

ACCELERATED RATE OF ALBINISM IN CHANNEL CATFISH EXPOSED TO METALS, Thomas Hunt Morgan School of Biological Sciences, Lexington, KY.

ences, Lexington, K.Y.
A. G. Westerman, and W. J. Birge.
The Progressive Fish Culturist, Vol. 40(4) Oct.,
1978. p. 143-146, 2 tab., 19 ref.

Descriptors: Metals, *Arsenic compounds, *Cadmium, *Copper, *Mercury, *Selenium, *Zinc, Fish physiology, Fish disease, Channel catfish, Bioassays, Fish eggs, Aquiculture, Water supply, Fish hatchery, Water pollution effects, Fish pathology, *Albinism, Albinos, Mutagens.

Heavy metals (As, Cd, Cu, Hg, Se, Zn) were shown to increase the incidence of albinism during shown to increase the incidence of albinism during 5 years of experiments with channel catfish (Ictalurus punctatus). Metal-induced albinism resulted from exposure of both adult fish and eggs. In egg bioassays, exposed populations consistently exhibited higher percentages (up to 6.3%) of albinos than did controls, but frequencies did not vary significantly for the six metals or for exposure concentrations which ranged from 0.5 to 250 ug/1. Metal contamination in a hatchery water sunplu vielded tions which ranged from 0.5 to 250 ug/1. Metal contamination in a hatchery water supply yielded frequencies of albinos corresponding directly with those observed for metal-exposed laboratory populations. Inasmuch as albinism has proved deleterious to fish survival and production, caution is recommended in using metallic compounds in hatchery management. Tests for albinism may prove useful in screening aquatic contaminants for mutagenic potential. (EIS-Katz) W79-02967

PHYSIOLOGICAL EFFECTS OF ELECTRO-FISHING ON LARGEMOUTH BASS,

Northwestern State Univ. of Louisiana, Natchitoches. Dept. of Biological Sciences. T. A. Burns, and K. Lantz.

Descriptors: *Methodology, *Largemouth bass, Fishing, Fishing gear, Fish physiology, Sampling, Fish blochemistry, Fish blood, Fish tissues, Stress, *Electric shocking gear, Electric current, *Electro-fishing, Micropterus salmoides.

Blood and tissue samples of adult largemouth bass (Micropterus salmoides) were taken from control fish and from fish that were electroshocked and is and from is that were electroshocked and allowed recovery times of 0,1,3,5.5, and 10 h. Shocking had no significant effect (P > 0.005) on hemoglobin, hematocrit, plasma protein, or percentage water content of tissue. No sexual differences in these factors were noted. Blood lactate increased significantly (P > 0.01) 1 h after electroshocking, returned to pre-shocked levels within a 3 h period, and then continued to decline. (EIS-Katz) W79-02968

LETHALITY OF ELECTROSHOCK TO TWO FRESHWATER FISHES,

Wyoming Game and Fish Dept., Casper. R. A. Whaley.

The Progressive Fish Culturist, Vol. 40(4), Oct., 1978. p. 161-163.

Descriptors: Freshwater fish, Bioassay, *Mortality, *Lethal limit, *Electric shocking, Electric current, *Electro fishing, *Electric fishing gear, Stress fishing, Fantail darter, Sunfish, Bluegill sunfish, Lepomis macrochirus, Etheostoma flavellare, Pulse frequency.

The lethality of electroshock to fish was examined by subjecting fantail darters (Etheostoma flabel-lare) and bluegills (Lepomis macrochiru) to levels and patterns of pulsating direct current electricity within the ranges commonly employed in the col-lection of fish in the field. Mortality of fish exposed to pulsating direct current increased with increased

pulse frequency and exposure time. However, mortalities were negligible among fish exposed for 15 s or less, regardless of the electrical characteristics. (EIS-Katz) W79-02969

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TOXICITY OF SELECTED CHEMICALS TO THE FAIRY SHRIMP, STREPTOCEPHALUS SEALI, UNDER LABORATORY AND FIELD

Alabama Dept. of Conservation and Natural Resources, Montgomery. Game and Fish Div. J. L. Moss.

The Progressive Fish Culturist, Vol. 40(4) Oct., 1978, p. 158-160, 2 tab., 12 ref.

Descriptors: *Toxicity, *Shrimp, Crustaceans, *Bioassay, Laboratory tests, Insecticides, Pesticides, *Chlorinated hydrocarbon pesticides, Mortality, Fairy shrimp, *Formalin, *Benzene hexacloride, *Diquat, *Paraquat, *Dylox, *Potassium permanganate, Streptocephalus seali.

Laboratory toxicity tests were conducted with six chemicals to determine their effect on fairy shrimp (Streptocephalus seal). Formalin (15 and 25 mg/1) and Diquat (0.25 to 2.0 mg/1) were not toxic to fairy shrimp. Paraquat (0.25 to 2.0 mg/1) were moderately toxic. Cylox (0.10 and 0.25 mg/1) were moderately toxic. Cylox (0.10 and 0.25 mg/1) were moderately toxic; mortality exceded 82% at 48 h. Potassium permanganate (0.5 to 4.0 mg/1) produced 100% mortality in less than 24 h. Pond treatments with potassium permanganate (1.0 and 2.0 mg/1) produced more rapid mortality than did Dylox (0.25 mg/1). Neither chemical completely eliminated all fairy shrimp from ponds, except in isolated cases. (EIS-Katz)

AN IMPROVED EXPERIMENTAL MEDIUM FOR FRESHWATER TOXICITY STUDIES USING DAPHNIA MAGNA, Polytechnie of the South Bank London (England).

Dept. of Applied Biology. M. P. Tevlin.

Water Research, Vol. 12, p 1017-1024, 1978. 4 tab, 6 fig, 29 ref.

Descriptors: Metals, *Cadmium, *Iron, *Methodology, *Daphnia, Chlorella, *Bioassay, Laboratory tests, Toxicity, Water pollution effects, Laboratory equipment, Zooplankton, Phytoplankton, Freshwater, Hydrogen ion concentrations

A medium suitable for Daphnia culture with the green alga, Chlorella sp. was chosen from the literature to investigate physiological responses by Daphnia to sublethal cadmium poisoning. Like most synthetic media this included the labile February of the control most synthetic media this included the labile Fe-EDTA complex as a source of soluble iron which is shown to be essential for growth of both Daph-nia and Chlorella. Synthesis of a ferri-gluconate complex as an alternative source of soluble iron is described; this complex being theoretically more iron-specific than Fe-EDTA, whilst providing equally well for Chlorella growth and Daphnia growth and fecundity. TES buffer (pKa 7.5) and HEPES buffer (pKa 7.55) were used at various concentrations, and 0.001M HEPES is shown to restrict PI variation to within 0.5 pH unit over 10. concentrations, and 0.001M HEPES is shown to restrict pH variation to within 0.5 pH units over 10 days without adversely affecting Chlorella growth or Daphnia growth and fecundity. A bioassay of the reduction in 48 h acute toxicity of cadmium to Daphnia in media containing each potential chelating agent in turn is used. These data indicate that 0.001M HEPES buffer does not complex cadmium to 0.1 mm and that ferrighteeners is less likely to at 0.1 ppm, and that ferri-gluconate is less likely to do so than ferri-EDTA. (EIS-Katz) W79-02972

ACUTE TOXICITY OF MERCURY AND SELE-NIUM TO CRASSOSTREA GIGAS EMBRYOS AND CANCER MAGISTER LARVAE,

Moss Landing Marine Labs., CA.

N. Glickstein Marine Biology, Vol. 49: 1978. p 113-117, 3 tab, 1

Effects Of Pollution—Group 5C

Descriptors: *Metals, Toxicity, Bioassay, Laboratory tests, Mortality, Oysters, Crabs, Molluscs, Crustaceans, *Mercury, *Selenium, *Antagonism, *Additive toxicity, Statistical analysis, Juvenile stages, Sea water.

stages, Sea water.

The possible modification of mercury toxicity by selenium in embryos of the Pacific oyster Crassostrea gigas and the larvae of the crab Cancer magister was investigated. Mercury concentration eliciting abnormal development in 50% of the oyster embryos (EC50) was 5.7 micrograms/liter-1 (48 h) and mortality in 50% of the crab larvae (LC50) occurred with 6.6 micrograms/l - 1, 96 h). The 48 h EC50 for selenium was greater than 10,000 micrograms/l - 1 for oyster embryos and the 96 h LC50 for crab zoeae was 1040 micrograms/l - 1. The response from each species, when exposed to both toxicants, revealed that a high level of selenium (> or equal to 5,000 micrograms/l - 1) increased mercury toxicity. Moderate selenium concentrations (10 to 1,000 micrograms/l - 1) tended to decrease mercury toxicity, although no statistical verification could be made. The order of administration of toxicants had no effect on the response of Crassostrea gigas embryos. Early developmental stages (< of equal to 8 h) of C. gigas embryos were most sensitive to dissolved Hg; toxicant administration 24 h after fertilization resulted in no apparent abnormalities in development. (EIS-Katz) W79-02973

INTERACTIONS OF METHYLMERCURY, CADMIUM, AND SALINITY ON REGENERATION IN THE FIDDLER CRABS UCA PUGILATOR, U. PUGNAX AND U. MINAX,
Rutgers - The State Univ., Newark, NJ. Dept. of
Zoology and Physiology.

Marine Biology, Vol. 49, 1978. p 119-124, 3 fig, 24

Descriptors: *Methylmercury, *Cadmium, *Salinity, Crabs, Fiddler crabs, *Bioassay, Laboratory tests, Animal physiology, Animal behavior, Additive toxicity, Metals, Water pollution effects, Methodology, Calcium, Antagonism.

After multiple autotomy in the fiddler crabs Uca pugilator, U. pugnax and U. minax, both methylmercury and cadmium retard limb regeneration and ecdysis. When crabs in sea water are exposed to a mixture of both metals, the effect is increased, indicating that the two are interacting in an additive way. In 50% sea water (= 15% S), the effects of cadmium are greatly intensified so that growth of limb buds is extremely slow, if it occurs at all. When methlymecury is present in the water at the same time, the severe effects of cadmium are somewhat ameliorated, indicating an antagonistic interaction of the two metals under these conditions. Adding additional calcium to the 50% sea water also decreased the severity of the cadmium effect, also decreased the severity of the admium effect, thus supporting the idea of a calcium-cadmium competition. (EIS-Katz)

NUTRIENT REGENERATION BY ZOOPLANK-TON DURING A RED TIDE OFF PERU, WITH NOTES ON BIOMASS AND SPECIES COMPO-SITION OF ZOOPLANKTON,

Dalhousie Univ., Halifax (Nova Scotia). Dept. of

Oceanography. S. L. Smith

Marine Biology, 49, p 125-132 (1978) 4 tab, 5 fig,

Descriptors: *Nutrients, *Zooplankton, *Phyto-plankton, *Red Tide, Dinoflagellates, Gymnodin-ium, Chlorophyll, Peru, Biomass, *Primary pro-ductivity, Copepods, Crustacean, Nitrogen com-pounds, Nitrogen cycle, Salinity, Water tempera-ture.

During March and April 1976, a red tide, dominated by the dinoflagellate Gymnodinium splendens Lebour, developed off Peru. At the height of the bloom, the euphotic zone was 6 m deep and the chlorophyll a at the surface was 48 micrograms/1-1. A daily collection of zooplankton at 09.00 hrs

showed large fluctuations of biomass, from 0.2 to 3.84 g dry weight m-2 in a water column of 120 m. Copepodids and nauplii dominated the collections. During a period of reduced wind, the adult copepods were a mixture of the species characteristic of the coastal upwelling system and the neritic species associated with more northerly, tropical waters. Nitrogen regeneration by the zooplankton varied with the development of the bloom, the type of zooplankton dominating the experiment, and biomass fluctuations, but never accounted for more than 25% of the nitrogen uptake by phytoplankton. (EIS-Katz) W79-02975 W70 02075

HATCHERY ALARM SYSTEM TO PROTECT AGAINST CATASTROPHIC EGG OF FISH KILLS.

National Fish Hatchery White Sulphur Springs, WV.

For primary bibliographic entry see Field 5G. W79-02977

POLYCHLORINATED BIPHENYLS: TRANS-FER FROM MICROPARTICULATES TO MARINE PHYTOPLANKTON AND THE EF-FECTS ON PHOTOSYNTHESIS, Stanford Univ., Pacific Grove, CA. Hopkins Marine Station.

Marting Station.
L. W. Harding, Jr., and J. H. Phillips, Jr.
Science, Vol. 202, 15 Dec. 1978, p 1189-1192. 2 tab, 3 fig, 25 ref.

Descriptors: Aroclor, *Polychlorinated biphenyls, Phytoplankton, *Marine phytoplankton, Photosyn-thesis, *Primary production, *Diatoms, Algae, Plant physiology, Particle size, Sediments, Path of pollutants, *Water pollution effects, Chlorophyll, Bioassays.

Polychlorinated biphenyls (PCB's) initially associated with micro-particulates are incorporated into marine diatom cells. The time course of transfer is rapid; equilibrium is attained within several hours. Assays with chlorophyll a fluorescence in vivo indicate that the transferred PCB's reach sites in the photosynthetic machonery that are sensitive to the effects of these compounds. (EIS-Katz) W79-02978

SELENIUM METABOLISM IN THE MARINE PHYTOPLANKTERS TETRASELMIS TETRATHELE AND DUNALIELLA MINUTA, International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.

I I Wrench

Marine Biology, Vol. 49, p 231-236, 1978. 2 tab, 3 fig, 15 ref.

Descriptors: Phytoplankton, Marine phytoplankton, "Selenium, "Plant physiology, Plant biochemistry, Plant metabolism, Radioactivity, "Radioactivity techniques, Water pollution effects, Path of pollutants,

Radioactive selenite-75 has been used to investigate the metabolic transformation of inorganic selenium by the marine phytoplankters Tetraselmis tetrathele and Dunaliella minuta. The majority of radioselenium taken up from culture media during growth becomes associated with cellular protein. A small quantity of this protein-bound selenium can be volatilised by treatment with strong acid, suggesting the presence of hydrogen selenide. However, the principal fraction of selenium appears to be integrated into the primary protein structure. Enzymic hydrolysis of phytoplankton protein and subsequent chromatography of hydrolysates revealed the presence of seleno-analogues of the sulphur amino acids. Selenium amino acids were also detected in non-protein extracts. (EISwere also detected in non-protein extracts. (EIS-Katz) W79-02979

PHYTOPLANKTON AND COOLING SYSTEMS: TEMPERATURE EFFECTS USING DIFFERENT INTAKE AND DISCHARGE DEPTHS,

Atomic Energy of Canada Ltd., Chalk River (On-tario), Chalk River Nuclear Labs. J. W. McMahon, and A. E. Docherty. Water Research, Vol. 12, 1978, p 925-929, 1 tab, 2

Descriptors: "Phytoplankton, "Water temperature, Water pollution effects, Plant pathology, Plant physiology, Plant populations, Power plants, "Thermal pollution, Thermal power, "Thermal power plants, Thermal stratification, Thermal water, Water circulation, Waste treatments, Onsite investigations, Lakes, "Phytoplankton species succession, Dissolved oxygen, Diatoms.

The effect of depth of intake and controlled discharge of heated waters (T-10 degrees C) on a natural phytoplankton community in a cold water lake was studied using polyethylene enclosures. Changes in plankton species composition and cell concentrations were used as indicators of temperature effects. Of three intake-discharge arrangements studied (surface intake-surface discharge) only the first design produced statistically significant increases in plankton numbers. A deep intake-surface discharge resulted in the least biological and physical changes in the lake water. Phytoplankton species succession in the heated water was similar to patterns observed in the open lake. (EIS-Katz) lake. (EIS-Katz) W79-02980

EFFECTS OF SALINITY ON SYNTHESIS OF DNA, ACIDIC POLYSACCHARIDE, AND GROWTH IN THE BLUE-GREEN ALGA, GOM-PHOSPHAERIA APONINA,

University of Southern Florida, Tampa. Dept. of

D. F. Martin, and M. H. Gonzalez. Water Research, Vol. 12, 1978. p 951-955. 1 tab, 2 fig, 29 ref.

Descriptors: *Algae, Plant physiology, Plant nutri-tion, Plant biochemistry, Enzymes, *Salinity, Water quality, Sea water, Artificial sea water, Lab-oratory tests, Growth rates, *DNA, Carbohy-drates, *Polysaccharide synthesis, Gomphos-phaeria, Growth rates, *Cyanophata.

A blue-green alga, Gomphosphaeria aponina, was grown in artificial sea water at salinities 20-36%. Fair to good growth was obtained at al salinities, and growth constants (Ke) were obtained. A parabolic relationship was obtained for the growth salinity relationship, e.g. (S-Smax)2 = -2p(Ke-K'e), where S and Smax is the given salinity and the maximum salinity, respectively, for which growth constants Ke and K'e were obtained; P is a constant. The rate of DNA synthesis increased linearly with growth constant above Ke = 0.95 constant. The rate of DNA synthesis increased linearly with growth constant above Ke = 0.95 day-1. Linear correlation coefficients were obtained for rate of polysaccharide synthesis and the rate of DNA synthesis, as well as for the rate of rate of DNA synthesis, as well as for the rate of DNA synthesis and the rate of synthesis of aponin. The latter is material isolated from G. aponina and has cytolytic activity toward the Florida red tide organism, Gymnodinium breve, an unarmoured dinoflagellate. (EIS-Katz) W79-02981

BIOACCUMULATION POTENTIAL OF POLY-CYCLIC AROMATIC HYDROCARBONS IN DAPHNIA PULEX, Oak Ridge National Lab., TN.

G. R. Southworth, J. J. Beauchamp, and P. K.

Water Research, Vol. 12, 1978, p 973-977. 2 tab. 2 fig., 15 ref.

Descriptors: Absorption, Daphnia, Crustaceans. Zooplankton, Oil, Oil spills, Water pollution effects, Path of pollutants, Bioassay, Laboratory tests, Methodology, "Polyaromatic, Aromatic hydrocarbons, "Naphthalene, "Anthracene. "Phenanthrene, "Pyrene, "9-methylanthracene, "Benz(a)anthracene, "Perylene, "Bioaccumulation, Bioaccumulation kinetics, Animal physiology. Model studies

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Group 5C-Effects Of Pollution

The bioaccumulation potentials by aquatic biota from aqueous solution were determined for seven polycyclic aromatic hydrocarbons (PAH). The PAH were tested using Daphnia pulex and consisted of the following compounds: naphthalene, anthracene, phenanthrene, pyrene, 9-methylanthracene, benz(a)anthracene and perylene. Bioaccumulation kinetics were described as a first order approach to equilibrium in a two-compartment model (water and Daphnia), using a two-stage technique to esti-mate uptake and elimination rates, while accounting for decreasing aqueous concentrations. Esti-mates of equilibrium concentration factors were obatined by two methods: (1) evaluating the kinetic model as t tends to infinity and (2) direct measurement of concentration factor at t = 24h. Estimations of equilibrium concentration factors ob-taned by the two methods we in good agreement, and increased dramatically with increasing molcuand increased dramatically with increasing moleu-lar weight within the series of compounds. The calculated n-octanol-water partition coefficient was shown to be a good predictor of bioaccumula-tion potential of PAH in Daphnia. PAH were concentrated from a high of about 10,000-fold for benz(a)anthracene to a low of about 100-fold for naphthalene. (EIS-Katz) W79-02982

PLANT COMPETITION FOR ATRAZINE.

Nebraska Univ., Lincoln. Dept. of Agronomy. For primary bibliographic entry see Field 5A. 11/70 02085

A MEASURE OF RESPONSE TO PERTURBA-TION USED TO ASSESS STRUCTURAL CHANGE IN SOME POLLUTED AND UNPOL-LUTED STREAM FISH COMMUNITIES

Delaware Univ. Newark, Dept. of Biological Sci-For primary bibliographic entry see Field 5B.

W79-02996

W79-02997

CORRELATIONS OF FISH CATCH AND ENVI-RONMENTAL FACTORS IN THE GULF OF

Bedford Inst. of Oceanography, Darthmouth(Nova Scotia). Marine Ecology Lab. For primary bibliographic entry see Field 2L

THE PRESENCE OF POLLUTANT HYDRO-CARBONS IN ESTUARINE EPIPELIC CARBONS IN ESTU-

Bristol Univ. (England). School of Chemistry. S. Thompson, and G. Eglinton.
Estuarine and Coastal Marine Science, vol. 4, p. 417-425, 1976. 3 fig., 2 tab., 18 ref.

Descriptors: *Organic compounds, Analytical techniques, *Solvent extractions, *Estuaries, Sediments, Laboratory tests, Metabolism, Path of pollutants, *Diatoms, Absorption, Animal physiology, Environmental effects, Chromatography, Mass spectrometry, Biochemistry, *Oil pollution, *Oil spills, Pollutant identification, Bioaccumulation, Gyrosiqma sp., Nitzchia sp., Nereis sp., Epipelic diatoms, *Seven Estuary(England).

The presence of a complex mixture of aliphatic hydrocarbons in the organic extracts of 3 popula-tions of estuarine epipelic diatoms was reported. The aliphatic hydrocarbon distributions were resolved by capillary gas chromatography and by computerized gas chromatography/mass spectrometry and were shown to be similar to the characteristic crude oil-type sliphatic hydrocarbon distribution found in the estuarine sediment. Crude oil-type polynuclear aromatic hydrocarbons found in the sediment were not present in the diatoms. The possible pathways of selective incorporation of pollutant hydrocarbons into epipelic diatoms and the environmental significance of the process were discussed. (Katz) W79-02998

5D. Waste Treatment Processes

BILGE WATER TREATMENT WITH A TABULAR ULTRAFILTRATION SYSTEM,
David W. Taylor Naval Ship Research and Development Center, Bethesda, MD.
L. R. Harris, D. F. Jackson, and P. Schatzberg.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 328, Price codes: A03 in paper copy, A01 in microfiche. Report No. DTNSRDC-76-0036, October 1976. 36 p, 11 fig, 5 tab, 11 ref, 2 append.

Descriptors: *Membrane processes, *Separation techniques, *Ultrafiltration, Water treatment, Waste water treatment, Oil spills, Detergents, Cellulose, Waste water, Flux rates, Oil wastes, Olly water, Bilge water, Filtration.

Results of an investigation evaluating the effectiveness of cellulosic (Type A) and noncellulosic (Type D) tubular ultrafiltration (UF) membranes in separating various oils from water are presented. Two commercially available tubular UF mem-Two commercially available tubular UF membranes, having the same geometry and the same pore size, and three oils were selected for the investigation. It was found that: the type D provided higher UF rates (flux) than the type A, and that the D membrane removed oil in the presence of detergent; removal of oil from water to less than 15 mg/l was achieved with either membrane; flux declining resulting from exposure to bilge water was recovered completely through membrane cleaning with type D only; cumulative irreversible flux decline occurred with type A upon exposure to bilge water; and high removal efficiencies of some dissolved metals found in bilge water was achieved with both membrane types. A schematic diagram of the UF test system is provided. (Davison-IPA) W79-02502

UPGRADING TEXTILE OPERATIONS TO REDUCE POLLUTION, VOLUME 1: IN-PLANT CONTROL OF POLLUTION.

CONTROL OF POLLUTION.
Environmental Protection Agency, Cincinnati, OH. Office of Technology Transfer Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 429, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-625/3-74-004, October 1974. Vol. 1 of 2. 121 p, 18 fig, 52 tab, 11 ref, 2 append.

Descriptors: *Textiles, *Water pollution, *Air pollution, *Waste water treatment, *Effluents, *Indus-Waste water iteration wastes, Liquid wastes, Waste water disposal, Recycling, Bleaching wastes, Solid wastes, Solutes, Water requirements, Water Quality Act, Pollution abatement, Water pollution abatement, Solvents, Surveys, Water pollution sources. Water reuse, Flow control, Water

Water pollution abatement and air pollution abatement are discussed in this first volume of a two volume series on reducing pollution in the textile industry. As a first step in water pollution abate-ment waste water is characterized by a waste survey involving a preliminary survey, a detailed survey, a data evaluation, and continued monitoring. Major sources of wastes in textile operations are process effluents from: (1) wool scouring, (2) are process effluents from: (1) wool scouring, (2) wool finishing, (3) geige goods mills, (4) woven fabric finishing, (5) knit fabric finishing, (6) carpet mills, (7) stock and yarn dyeing and finishing, and (8) specialized finishing. Other areas of water pollution abtement considered are: water reuse, flow reduction, waste segregation, and pretreatment of textile wastes. A panel discussion on the inplant control of pollution examined the substitution of processes and materials. Case histories are used to illustrate programs for water conservation. It is recommended that waste water be segregated so that only dirty water is sent to lazoons, while the that only dirty water is sent to lagoons, while the more-or-less clean water be used in the dirtier processes. Pretreatment of textile wastes, necessary for protection of the treatment system, involves screening for lint, fiber removal and pH regulation of highly alkaline wastes. It is further recommended that the use of each chemical and its impact on

pretreatment, treatment, ecology, and end disposal be thoroughly reviewed. The discussion of air pol-lution abatement concentrates on an emissions survey, particulate control and solvent recovery. (See also W79-02505) (Daivson-IPA) W79-02504

UPGRADING TEXTILE OPERATIONS TO REDUCE POLLUTION VOLUME 2:

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REDUCE POLLUTION VOLUME 2; WASTEWATER TREATMENT SYSTEMS. Metcalf and Eddy, Inc., Boston, MA. Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 566, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-625/3-74-004, October 1974. Vol. 2 of 2. 49 p, 10 fig, 7 tab, 4 ref.

Descriptors: *Textiles, *Waste water treatment, *Biological treatment, *Activated carbon, Cost analysis, Aerobic treatment, Trickling filters, Activated sludge, Aeration, Lagoning, Water pollution, Water pollution control, Water pollution abatement, Water quality control, Water treatment, Effluents, Industrial wastes, Chromium, Copper, Mercury, Zinc.

Copper, Mercury, Zinc.

The constantly changing manufacturing processes and resulting waste waters of the textile industry necessitate continued monitoring and upgrading of the waste water treatment systems. The sources of pollution in textile process waste waters include the natural impurities extracted from the fiber along with the processing chemicals, which are either discharged directly or leached during rinsing; traces of the heavy metals, chromium, copper, zinc and mercury, are often found in these waste waters. Biological waste water treatment and granular activated carbon treatment are presented, together with case histories, as effective waste water treatment methods include: trickling filters, activated sludge, rotating biological disks, extended aeration, and lagoons. The granular activated carbon treatment, relatively new to the textile industry, involves fillering the orgaic chemicals from waste waters by passing the water through a bed of carbon, whereby the chemicals are held back by Van de Waals forces, while the water continues to flow through the carbon free of organic contaminants. Construction costs for three common biotreatment methods are presented, and the economics of the granular activated carbon method are discussed. (See also W79-02504) (Davison-IPA) W79-02505

THE U-TUBE FOR WATER AERATION,

Rocketdyne, Canoga Park, CA. Rocketdyne, Canoga Park, CA.
R. C. Mtichell, and A. D. Lev.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-258 688,
Price codes: A08 in paper copy, A01 in microfiche.
Final Report No. R-8043, march 1970. 171 p, 55
fig, 16 tab, 28 ref, 4 append. D1-14-12-434.

Descriptors: *Waste treatment, *Aeration, *Sewage treatment, Waste water treatment, Models, U-tubes, Oxygen, Effluents, Design criteria, Water pollution treatment, Prototype tests, Analytical techniques, Prototypes, Jefferson Parish, Louisiana.

Complete results of the experimental and analytical investigation and the development of the U-tube areation concept for waste water applications are presented. The three major tasks completed were: (1) experimental verification of oxygen transfer efficiencies and exploration of practical aspects of U-tube operation; (2) analytical investigation of the two key applications -- post aeration of effluent from a sewage treatment plant and in-site aeration trom a sewage treatment plant and in-site aeration of sanitary sewer flows to prevent anaerobic conditions; (3) investigation and design of prototype Utube systems emphasizing designs for installation in the Jefferson Parish, Louisiana, sewer system. Mass transfer and fluid dynamics behavior of a representative prototype U-tube system for long ranges of design variables and operating conditions are characterized through experimental data. An analytical model of the system is described, and

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Waste Treatment Processes—Group 5D

then applied, using experimental data, to predict performances and operating characteristics of large-scale U-tube systems in various applications. It was found that the U-tube technique is a practical, flexible efficient method, particularly suited to applications for raising the dissolved oxygen concentration of a moving stream. Flexibility in the choice of configurations and other variables allow efficient specific designs in many applications and requirements. Advantages of U-tube aeration systems include: require little space; can be designed with no moving parts; require no operating labor and little maintenance; and have substantial cost savings over conventional aeration methods. (Davison-IPA)

W79-02506

FEDERAL GUIDELINES: INDUSTRIAL COST RECOVERY SYSTEMS, MUNICIPAL WASTEWATER TREATMENT WORKS CON-STRUCTION GRANTS PROGRAM.

Environmental Protection Agency, Washington, DC. Office of Water Program Operations. For primary bibliographic entry see Field 5G. W79-02508

ELIMINATION OF WATER POLLUTION BY RECYCLING CEMENT PLANT KILN DUST,

Portland Cement Association, Skokie, IL. N. R. Greening, F. M. Miller, C. H. Weise, and H. Nagoo.

Nagoo. Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 080, Price codes: A04 in paper copy, A01 in microfiche. Final Report No. EPA-600/2-76-194, July 1976. 68 p, 10 fig, 24 tab, 9 ref. 802196.

Descriptors: *Portland cements, *Separation techniques, *Chemical reactions, Alkali-aggregate reactions, Water pollution, Waste water treatment, Neutralization, Alakli metals, Spraying, Dusts, Industrial wastes, Pyroprocessing techniques.

The feasibility of separating cement plant kiln dust into alkali-rich and alkali poor fractions using fluidized bed, flame-spary and other pyroprocessing techniques was investigated. The effect of varying a number of process parameters on the achievement of the four following goals was studied: (1) effective feeding of the kiln dust raw material; (2) maintenance of flame stability and of adequate temperature to achieve alkali volatilization; (3) achievement of separation of these two fractions until collection was complete; and (4) efficient collection of the two kiln dust fractions. Variations in the process parameters included: the feeding system and fluidizing arrangement; the portion of the system designed for alkali entrapment; the dust collection mechanism; the temperature of the flame and collection system; and the collecting medium. The first two goals were achieved, and after optimization of all the process parameters all goals were achieved. Suggestions for the achievement of the goals in other ways were made after a theoretical collection of the system can be collected to the collection of the goals in other ways were made after a theoretical collection of the system collections. were achieved a obgestions to the achievement of the goals in other ways were made after a theoretical study of the operative chemical was made. (Davison-IPA)
W79-02509

CHITOSAN -- A POLYMER FROM SEAFOOD WASTE, FOR USE IN TREATMENT OF FOOD PROCESSING WASTES AND ACTIVATED

Georgia Univ., Athens, Coll. of Agriculture Experiment Stations. W. A. Bough.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 078, Price codes: A04 in paper copy, A01 in microfiche. Report No. NOAA-76040901, 5 p, 2 fig, 9 tab, 13 ref. SG-04-5-158-4.

Descriptors: *Chitosan, *Waste treatment, *Food processing industry, *Water pollution, Shellfish, Shrimp, Crab, Coagulation, Activated sludge, Proteins, Polymers, Byproducts, Waste water treatment, Effluents, Water conservation, Food wastes, *Carbohydrates(High molecular weight).

The use of chitosan, a high molecular weight car-bohydrate processed from the chitin in shrimp and crab wastes, as a coagulating agent in the treatment of food wastes is discussed. Its use in vegetable of food wastes is discussed. Its use in vegetable processing wastes, poultry processing wastes, egg breaking wastes, activated brewery sludge, activated vegetable sludge, meat processing and curing wastes, shrimp processing wastes and fruit cake wastes are examined. Results of a comparison of the coagulated byproducts obtained from food processing wastes suggest that chitosan would be useful as an agent for reducing waste loads and for byproduct recovery. The recovered protein byproduct slos has a potential use as protein in animal feeds. Chitosan was shown to be equal to, or better than other commercially available polymers in performance. (Davison-IPA)

ELECTROCHEMICAL BIOCIDE.

ELECTROCHEMICAL BIOCIDE, Life Systems, Inc., Cleveland, OH. C. A. Bodo, G. G. See, and R. A. Wynveen. Available from the National Technical Information Service, Springfield, Va 22161 as AD-A028 304, Price codes: A04, A01 in microfiche. Annual Report No. LSI-ER-221-23, May 1976. 52 p, 21 fig, 5 tab, 3 ref. DAMD17-74-C-4102.

Descriptors: *Waste water treatment, *Sewage treatment, *Disinfection, *Microorganisms, Aquatic microorganisms, E. coli, Bacteria, Electrodes, Equipment, Sewage, Electrochemistry, Electric reactors, Water purification, Electrolysis.

An alternate raw sewage treatment method called an Electrochemical Biocide is discussed. The procan Electrochemical Biocide is discussed. The process utilizes low level voltages at chemically-inert electrodes to pass alternating current through the water to destroy microscopic flora. Objectives of this research and development program included: a demonstration of process feasibility; expansion of the Electrochemical Biocide reactor design; determination of the engineering parameters affecting process effectiveness and efficiency; establishment of hypothesis for the microorganism kill mechanism; and recommendations for scaling the process nism; and recommendations for scaling the process to the requirements of the U.S. Army Medical Research and Development Command and Nation-al Aeronautics and Space Administration. The test al Aeronautics and Space Administration. The test hardware and process are detailed. Results showed that the microorganisms were completely destroyed. Ten specific direct conclusions and three indirect conclusions resulting from the current research are presented and include: an electrical frequency of less than one cycle per second enhances the effectiveness in destroying microorganisms; the process is more effective in treating sewage water than test water due to the generation of chlorin and hypochlorite; E coli was the cost resistant bacterium; improvement in process performance resulted from increased mass transfer, closer electrode spacing and reduced electrical frequencies: rode spacing and reduced electrical frequencies; and destruction of the microorganisms takes place at or near the electrode for unbuffered test water without sodium chloride. Further testing is recom-mended. (Davison-IPA) W79-02514

FINANCIAL IMPLICATIONS OF WASTE MANAGEMENT SYSTEMS FOR SHELLFISH PROCESSING,

Georgia Univ., Athens.

For primary bibliographic entry see Field 5G. W79-02516

FEASIBILITY OF THE FUNCTIONAL USE OF VEGETATION TO FILTER, DEWATER AND REMOVE CONTAMINANT FROM DREDGED

Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab. For primary bibliographic entry see Field 5E. W79-02517

UPGRADING DIARY PRODUCTION FACILITIES TO CONTROL POLLUTION -- IN-PLANT CONTROL OF WASTE, Cornell Univ., Ithaca, NY. DePt. of Food Science.

For primary bibliographic entry see Field 5G. W79-02518

UPGRADING DAIRY PRODUCTION TO REDUCE POLLUTION -- CHOOSING THE OP-TIMUM FINANCIAL STRATEGY FOR POLLU-TION CONTROL.

Commins (J. A.) and Associates, Inc., Fort Wash-For primary bibliographic entry see Field 5G. W79-02519 ington, PA.

SOME IMPACTS OF SAFE DRINKING WATER STANDARDS ON RURAL WATER SYSTEMS. Mississippi State Univ., Mississippi State. Div. of Business Research. For primary bibliographic entry see Field 5G. W79-02522

EFFECT OF MERCURY ON NADH AND THE PROTECTIVE ROLE OF OXALACETATE, Georgia Univ., Athens. Dept. of Food Science. M. K. Hamdy, and O. R. Noyes. Bulletin of Environmental Contamination and Toxicology, Vol. 17, No. 1, p 112-120, 1977. 2 fig, 1 tab, 16 ref. OWRT B-069-GA(4), 14-31-0001-3870.

Descriptors: *Mercury, Metals, Water Pollution Sources, *Toxicity, Bacteria, *Bioindicators, Bio-logical treatment, *Indicator bacteria biocontrol, logical treatment, "Indicator pacteria biocontrol, "Microbial degradation, Absorption, "Biotransference, Biological uptake, Bacillus lickeninformis, Detoxification, Aquatic environment, "Malate, "Methylmercury, "Oxalacetate.

Effect of mercury chloride (HgCl2) and methyl-mercury (CH3HgCl) on malate (MDH) and lactate (LDH) dehydrogenases isolated from a mercury-resistant Enterobacter aerogenes was examined. Assays of enzymes were conducted spectrophotometrically at 340 nm. Results showed that the presence of 0.03 micro M CH3HgCl per 3 ml reaction mixture inhibited 12 and 67% of LDH activities, respectively; whereas, 0.03 micro M HgCl2 inhibited 48% of MDH activities. The inhi-HgCl2 inhibited 48% of MDH activities. The inhibition was due in part to interaction between HgCl2 and the coenzyme moiety (NADH) of both enzymes as evidenced from changes in spectral characteristics of NADH. Concentration (0.1 micro M/reaction mixture) of other compounds CdSO4, ZnSO4 or CH3HgCl had no effect on NADH. The addition of 0.02 micro M oxalacetate NADH. The addition of 0.02 micro M oxalacetate (OAA) but not tartarate, succinate, pyruvate or malate, restored the spectral characteristics of 0.02 micro M NADH. It is suggested that the enol form of DAA (10% at ph 7.0) combines with Hg++ to form a salt complex and thus removes Hg++ from NADH-Hg++ complex. A 10-fold increase in concentration of OAA as compared to HgCl2 is required to protect NADH from the action of magnetizing and restores its biological properties and mercurials and restore its biological properties and function. W79-02596

A FIELD STUDY OF TREATMENT VS. DEPTH OF SAND FILL IN A MOUND SYSTEM,

Maine Univ. at Orono. Land and Water Resources

Inst. S. D. Couture.

S. D. Courure.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-290 392,
Price codes: A05 in paper copy, A01 in microfiche.
MS Thesis, May 1978. 92 p, 27 fig, 6 tab, 38 ref,
append. OWRT A-040-ME(1).

Descriptors: Aerobic conditions, Chemical oxygen demand, Coliforms, *Denitrification, Effluents, Groundwater, Nitrates, Nitrification, Nitrogen, *Phosphorus, *Septic tanks, Topsoil, *Waste water treatment, *Waste disposal, Ammonia nitrogen, Fecal coliform, Mound on-site waste disposal systems, Organic nitrogen, Total dissolved phosphorus

A field study was performed using a mound system designed and constructed to treat septic tank effluent in an area of seasonally high groundwater. The

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Group 5D—Waste Treatment Processes

objective was to measure the treatment of septic tank effluent versus depth of sand fill below the adsorption trench. The system was monitored during four sampling periods (8/77, 9/77, 10/77, and 11/77) for concentrations of soluble COD, total dissolved phosphorus, organic nitrogen, ammonia nitrogen, nitrate, and fecal coliform. Essentially complete removal of total dissolved phosphorus was found to occur within the first six inches of sand fill. Complete removal of the fecal indicator organisms occurred before the treated water intercepted the groundwater table. The internal clay barrier in the toe of the mound prevented ponded effluent from seeping out of the toe. It was concluded that the first six inches of the sand fill below the adsorption trench was aerobic and the lower portion of the sand fill below the adsorption trench and the original underlying soil were anaerobic. The situation of aerobic fill/anaerobic topsoil allowed for nitrification and denitrification to occur within the mound fill and underlying soil. W79-02604

THE EFFECT OF TEMPERATURE ON TREAT-MENT PLANT PERFORMANCE AND RELAT-ED TEMPERATURE STUDIES,

National Council of the Paper Industry for Air and Stream Improvement, Inc., New York. J. J. McKeown, A. Benedict, D. Buckley, and K.

NCASI Stream Improvement Technical Bulletin, No. 312, 82 p, May, 1978. 34 fig, 12 ref, 17 ref, append

Descriptors: "Pulp wastes, "Waste water treatment, "Temperature, "Aerated lagoons, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Pulp and paper industry, Heat balance, Foaming, Biological treatment, Biochemical oxygen demand, Suspended solids, Thermal insulation, Effluents.

Based on information provided by more than 60 pulp and paper mills currently participating in the continuing treatment plant performance analysis project maintained at the NCASI northeast regional center, this study on the effect of temperature on effluent treatment showed that heat loss in acrated stabilization basin systems is a function of surface area exposed to the atmosphere, independent of surface area exposed to the atmosphere, independent of surface area to horsepower intensity, and is affected by foam which acts as a thermal insulation barrier. The temperature of the biological reactor was a major factor in final effluent BOD and suspended solids concentrations and was predictable within the monthly average extremes of 5 and BOD reduction was found to be adequate to incorporate predictive modeling. The same was not true for suspended solids, however, although within a single treatment system a rise in BOD concentration generally resulted in a rise in suspended solids concentration. (Swichtenberg-IPC)

NUTRIENTS, TOXINS, AND WATER IN TER-RESTRIAL AND AQUATIC ECOSYSTEMS TREATED WITH SEWAGE PLANT EF-FLUENTS - FINAL REPORT OF THE UPLAND RECHARGE PROGRAM,

Marine Biological Lab., Woods Hole, MA. G. M. Woodwell, J. T. Ballard, J. Clinton, and E. V. Pecan.

Brookhaven National Laboratory, Report BNL 50513, 39 p, January 1976. 10 fig, 12 tab, 11 ref, 2 append.

Descriptors: *Sewage treatment, *Aquatic plants, *Deciduous trees, *Nutrients, Sewage effluents, Water quality, Water analysis, Ecosystems, Plant populations, Percolating water, Percolation, Phosphorus, Iron, Marshes, Marsh plants, Waste treatment, Water treatment, *Sere.

The objective was to appraise the capacity of terrestrial and aquatic plant communities for absorbing and retaining nutrients and organic matter in sewage and for releasing 'clean' water. The results showed the following: (1) Under normal circumstances, without the addition of water or

nutrients in sewage, the flux of nutrients into the groundwater was greatest under the agricultural communities and least under the late successional forest communities; (2) The highest concentrations of nutrients in the percolate of the untreated communities commonly occurred in the earliest stages of succession; (3) Treatment with sewage reduced the differences in concentration in the percolate between the communities of the sere; (4) Calculation of the budgets of the various ecosystems showed that the forested stages accumulated the largest fractions of the inputs; (5) Appreciable changes occurred in the quality of percolate under the controlled communities over the period of the experiment; and (6) Present indications are that if sewage-treatment systems using natural communities are to be devised, they will require combinations of aquatic and terrestrial systems. (EIS-Deal) W79-02638

ANALYSIS OF MODELS FOR DICHLORA-MINE REMOVAL BY ACTIVATED CARBON IN BATCH AND PACKED-BED REACTORS USING QUASILINEARIZATION AND ORTH-OGONAL COLLOCATION METHODS,

Illinois Univ. at Urbana-Champaign. Dept. of Chemical Engineering.
B. R. Kim. R. A. Schmitz, V. L. Snoeyink, and G.

W. Tauxe.

Water Research, Vol. 12, p 317-326, 1978. 5 fig, 2 tab. 17 ref. S-051-ILL.

Descriptors: *Activated carbon, Chlorination, Nitrogen chemical reactions, Chemical reduction, Model studies, Waste water treatment, *Mathematica models, *Dichloramine, Dechlorination, Chlorine residuals.

The reaction between dichloramine and activated carbon in batch and packed bed reactors has been described by a mathematical model involving proe transport and surface reaction rate as rate limiting steps. The poisoning of the surface resulting from the build-up of reaction products on the surface has also been taken into account. The orthogonal collection method was successfully used to solve models. Quasilinearization was used to determine necessary constants from batch reactor data, and these constants were used to accurately predict breakthrough curves for packed bed reactors. W79-02640

DISSOLVED-OXYGEN REGIMEN OF THE WILLAMETTE RIVER, OREGON, UNDER CONDITIONS OF BASINWIDE SECONDARY TREATMENT.

Geological Survey, Portland, OR. Water Resources Div.

For primary bibliographic entry see Field 5G.

W79_02657

POLYMER COAGULATION OF HUMIC ACID WATERS,

Clarkson Coll. of Technology, Potsdam, NY.
Dept. of Civil and Environmental Engineering.
J. K. Edzwald, J. D. Haff, and J. W. Boak.

Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 103, No. EE6, p 989-1000, December 1977 12 fig, 15 ref.

Descriptors: *Water supply, *Waste water treatment, *Flocculation, *Coagulation, *Polymers, Color, Humic acids, Environmental engineering, Alum, Effects.

The removal of color from water supplies using alum, polymers, and alum-polymer combinations is described. Humic acid was used as the natural color colloid and the results indicate that: (1) Alum alone requires relatively high dosages; (2) low molecular weight cationic polyelectrolytes used alone chemically interact with humic acid; and (3) alum combined with high molecular weight polymers is an effective coagulation process. Stoichiometry between the raw water humic acid concentration and the optimum coagulant dosage is reviewed. Experimental results are used to examine the stability of

humic acid and mechanisms of particle destabilization. (Bell-Cornell) W79-02715

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A FRESH WATER WASTE RECYCLING-AOUACULTURE SYSTEM.

Harbor Branch Foundation, Inc., Fort Pierce, FL. J. H. Ryther, L. D. Williams, and D. C. Kneale. Florida Scientist, Vol. 40, No. 2, p 130-135, Spring, 1977. 1 fig. 1 tab, 14 ref.

Descriptors: *Aqiculture, *Biological treatment, *Waste water treatment, *Nutrient removal, *Sewage effluents, Fish, Shrimp, Algae, Phytoplankton, Nitrogen, Phosphrous, Biomass, Grass carp.

The treatment system was tested during the period 3 March 1975-29 August 1975 in two 11x 4 x 0.6 m (25,000 l) PVC-lined earthen ponds. One pond was inoculated with the macroscopic alga Chara sp. Undiluted secondary effluent was passed through this pond at a rate of 500 l/day providing a turnover rate of 2% of the pond volume/day. Removal efficiencies for nitrogen and phosphorus were 83 and 87%, respectively. The second pond was stocked with 28 juvenile (20 g) grass carp. The fish were fed the harvest growth of the Chara. During the study period fish biomass showed an increase of 4.5 kg. Seventy-five juvenile (1.7 g) fresh water shrimp were added to the second pond to utilize potential food wastes from the inefficient grass carp. Shrimp biomass increased 1.2 kg during the study period. Problems encountered with this system were difficulty in handling Chara without retarding its growth and dense phytoplankton blooms. (Stihler-Mass) W79-02759

CHEMICAL TREATMENT FOR ORGANIC COLOR REMOVAL FROM GROUNDWATERS, Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
J. E. Bowie, Jr.

J. E. Bowie, Jr. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 209, Price codes: A12 in paper copy, A01 in microfiche. Doctoral Dissertation, August 1978. 244 p, 65 fig. 12 tab, 100 ref, 3 append. OWRT A-084-MISS(3), 14-31-0001-5024.

Descriptors: *Waste water treatment, *Chemical precipitation, *Water treatment, *Color, *Groundwater, *Chemical reactions, *Water purification, Coagulation, Flocculation, Oxidation, Reduction, Ultraviolet radiation, *Humic acids, Hydrogen ion concentration, Alum, Sodium sulfite, Cations, Ozone, Hydrogen peroxide, Polyelectrolytes.

A chemical treatment system for removing highly colored humic acid type compounds from water was developed. Four types of systems were tested: chemical precipitation-coagulation, oxidation/reduction, photo-oxidation/reduction, and polymerization. Both divalent and trivalent cationic precipitation coagulation systems were examined in which the color-causing organics are actually physially removed from the system. Trivalent cations were more efficient than divalent ones requiring only 1/10 the dosage for complete color removal and zeta-potential neutralization. A system was developed combining addition of alum and cationic polyelectrolyte and adjustment of pH to 5.5. The order of chemical addition, rapid mix, and flocculation stages of this system were optimized and the results tabulated. Of the oxidation and reduction treatments studied, only oxidation by ozone and hydrogen peroxide were effective in reducing color. Ultraviolet light treatment alone was ineffective, but irradiation with ultraviolet accelerate oxidation/reduction reactions and drive some reactions closer to completion. Ultraviolet was especially effective when used with sodium sulfite reduction, which alone was unreactive. Polymerization was totally unacceptable as a color remover. It is recommended that further research be done on four methods: (1) chemical precipitation-coagulation with or without polyelectrolytes; (2) ozonation; (3) ultraviolet light-air treatment with or without hydrogen peroxide; (4) ultraviolet light.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Waste Treatment Processes—Group 5D

sodium sulfite treatment in inert atmosphere. (Majtenyi-IPA) W79-02782

TECHNICAL GUIDELINES FOR PUBLIC WATER SYSTEMS.
Clean Water Consultants, El Dorado Hills, CA. For primary bibliographic entry see Field 5G. W79-02787

PROGRAM IMPLEMENTATION PROCE-DURES: IMPLEMENTATION OF TWO YEAR POST HIGH SCHOOL WASTEWATER TECH-NOLOGY INSTRUCTIONAL PROGRAMS.

Clemson Univ., SC. Dept. of Environmental Sys-For primary bibliographic entry see Field 5G. W79-02789

A CHEMICAL AND BIOLOGICAL EVALUA-TION OF THREE MINE DRAINAGE TREAT-MENT PLANTS,

MENT PLANTS,
Environmental Protection Agency, Wheeling,
WV. Surveillance and Analysis Div.
S. C. McPhilliamy, and J. Green.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-254 453,
Price codes: Ao5 in paper copy, A01 in microfiche. June 1973. 81 p, 6 fig, 17 tab, 6 ref.

Descriptors: *Coal mine wastes, *Mine acids, *Waste water treatment, *Sampling, Evaluation, Treatment plants, Streams, Stream flow, Benthos, Aquatic plants, Water chemistry, Water analysis, Pollutant identification, Water quality, Pennsylva-

Three mine drainage plants, Bercik, Kefovor and Thompson, operating at Jones and Laughlin Steel Corporation mines in Washington County, Penn-sylvania, were selected for chemical and biological sylvania, were selected for chemical and blological sampling. A fourth site, representing an untreated effluent discharged to a tributary and located on the Little Indian Creek north of Riversville, West Virginia, was selected as a control station. Chemical samples collected from four areas at each of the treatment plants included: the receiving stream above and below the tratment plant; the untreated mine discharge being pumped from the borehole; and the treated effluent before its discharge into and the treated effluent before its discharge into the receiving stream. Similar samples were collected at the control site. Ten additional parameters were included for analysis along with those associated with mine drainage. Generally, the plants were effective in removing common mine drainage parameters, but two of these plants occasionally discharged final effluent containing excessive concentrations of acidity, suspended iron and total iron. The treated mine effluent below the three plants offected the hearther in the receiving plants affected the benthos in the receiving streams. The most effective treatment plant, Ke-fover, has a larger receiving stream flow which dilutes the residual chemical constituents to a more tolerable level; the benthos in the receiving stream were only slightly affected. Thompson Plant, as effective as the Kefover Plant, occasionally discharged acid slugs, reducing its overall treatment capability. The benthos is severely depressed im-mediately below the Bercik Plant, the least effi-cient of those studied. The limited dilution capacity of the receiving stream impairs its operationa effectiveness. (Davison-IPA) W79-02794

OWENS-CORNING FIBERGLASS CORPORA-TION WASTEWATER TREATMENT FACILI-TY, ANDERSON, SOUTH CAROLINA, TECH-NICAL SUPPORT PROJECT MARCH-MAY

National Field Investigations Center-Cincinnati,

OH. Available from the National Technical Information Service, Springfield, VA 22161, as PB-231 123, Price codes: A05 in paper copy, A01 in microfiche. December 1973. 85 p, 30 fig. 11 tab, 7 append.

Descriptors: *Waste treatment, *Treatment facili-ties, *Effluent quality, *Industrial wastes, *Train-

ing, Samples, Chemical analysis, Sludge, Testing, Sampling. Aerobic digestion, Coagulation, Biologial oxygen demand, Acidity, Solid wastes, Water pollution, Measuring instruments, Suspended solids, Owens-Corning Fiberglass Corporation, Anderson, South Carolina.

To improve performance of the Owens-Corning Fiberglass Facility, at anderson, South Carolina, operators were trained in the use of the National Field Investigation Center (NFIC) operational control procedures. They were taught how to calculate control adjustment demands from sludge quality and process status tests, and how to display essential test data and process relationships, which would allow analysis of process response to control adjustments. In completing the evaluation of plant loadings and process response to control adjustments many components were calculated. plant loadings and process response to control adjustments many components were calculated, tabulated, and/or plotted. Operator skill was acquired during the project so that final effluent quality became consistent, and the plant was able to withstand 'shock loads.' The loadings and treatment accomplished during the final 77 days of the support project are tabulated. (Davison-IPA) W79-02796

THE USE OF THE PROTOCOCCACEAE FOR PURIFYING WASTE WATER (PRIMENIYE PROTOKOKKOVYKH VODOROSLEY DKYA OCHISKI STOCHNYKH VOD),

V. N. Yuzvenko.

V. N. Yuzvenko.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-258 711-T,
Price codes: A02 in paper copy, A01 in microfiche.
Report No. EPA-BTR-76-14, 1971. Sakhaarnaya
Promyshylennost', Vol. 45, No. 11, pp 20-22, 1971.
Translated by SCITRAN (Scientific Translation
Service), Santa Barbara, CA. 6 p, 1 tab.

Descriptors: *Waste water treatment, *Algae, *Agricultural wastes, *Sugar beets, Water purification, *Protococcaceae chlorella, Cenedesmus, Lime, Neutralization, Filtration, Lagoons, Waste water, Coagulation, Sedimentation, Ukraine, USSR, Soil disposal fields, Soil properties.

A method for purifying sugar process waste water in filtration fields is described. The filtering capac-ity of the soil in filtration fields at sugar plants in the Ukraine, SSR is very poor, and the natural processes of autopurification occur very slowly or not at all. The natural processes are intensified somewhat through liming these waste waters, and it was found that these processes were further enhanced with the addition of mixtures of Proto-coccaceae chlorella and cenedesmus. Waste water is first limed to neutralize it because the oxidizing is first limed to neutralize it because the oxidizing micro-organisms favor a neutral or slightly alkaline medium. Liming also facilitates coagulation of the colloid compounds in waste water, enhancing sedimentation of suspended particles. Liming is conducted during the production season and terminates at least three months before planting the algae in the waste water. Milk lime is used and introduced in an irrigation agitator with the water temperature at 5C. Algolization, seeding the waste water with mixture of Protococcaceae chlorella and cendesmus in paste or suspension, creates an and cendesmus in paste or suspension, creates an algae concentration which will ensure a predominance of algae over the entire purification period. Algolization is conducted in two stages: (1) the algae are planted in a reservoir for primary algolization, and (2) when the waste water becomes an aligae suspension, it is immediately dispersed into remaining reservoirs of waste water as stage two. Results of algolization of waste water as stage two. of filtration fields at sugar plants in Vinitsa, Kiev, and Odessa are tabulated. (Davison-IPA) W79-02797

EXPERIENCE WITH WASTE WATER ACID NEUTRALIZATION (ERFAHRUNGEN MIT ABWASSER-SAUREZNEUTRALISATION),

B. Kratz.
A vailable from the National Technical Information Service, Springfield, VA 22161 as AD-A028 198, Price codes: A02 in paper copy, A01 in microschew Yom Wasser, No. 17, pp. 83-88. Deceilog. 1974, 12 p, 3 fig, 1 tab. Translated by Army

Medical Intelligence and Information Agency, Washington, DC. Translation No. USAMIIA-K-

Descriptors: *Waste water treatment, *Industrial wastes, *Acidic water, *Nitrogen compounds, *Neutralization, Sludge, Lime, Aeration, Explosives, Equipment, Filters, Toxic wastes, Water requirements, Water cooling, Water chemistry, Water analysis, Effluents, Germany.

The waste water treatment systems and processes of trinitrotoluene (TNT) plants built in Germany during the mid 1930s are examined. In producing 4,000 tons of TNT per month, 40,000 m³ per day of water were consumed; 5 to 6,000 m³ of this was acidic waste water contaminated with nitrogen compounds. There were three varieties of waste compounds. There were three varieties of waste water: manufacturing was water; condensate from sulfuric acid concentration; and building cleaning waste water. The development of the waste treatment process from a clarification system to a formal treatment plant is discussed, and a schematical control of the state of ic view of the neutralization plant is provided. (Davison-IPA) W79_02798

OXIDATION OF PESTICIDES BY OZONE AND ULTRAVIOLET LIGHT, Houston Research, Inc., TX.

Houston Research, Inc., T.X.
C. E. Mauk, H. W. Prengle, Jr., and J. E. Payne.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A028 306,
Price codes: A04 in paper copy, A01 in microfiche.
Final Report No. 7206, July 1976, 73 p, 13 fig. 46
tab, 6 ref. IT76270D048-07, DAAG53-76-C-0089.

Descriptors: *Waste treatment, *Waste water treatment, *Pesticide removal, *Toxic wastes, *Ozone, *Ultraviolet radiation, DDT, Pentachlorophenol, Vapam, Baygon, Models, Mathematical models, Gas chromatography, Water purification, Water quality control, Effluents, Potable water, Water pollution treatment.

An experimental study to determine the feasibility of the oxidative destruction in water of the five pesticides, malathion, Baygon, Vapam, pentachlorpesticides, malathion, Baygon, Vapam, pentachlor-ophenol, and DDT, by ozone with ultraviolet light is reported. The individual pesticides were treated by ozone with varying combinations of ultraviolet intensities and temperatures in a sparged stirred tank reactor. Gas chromatographic analysis indicated destruction of the pesticide and that the total organic content of the water, including contributions from the pesticide and intermediate oxidation. organic content of the water, including contribu-tions from the pesticide and intermediate oxidation products, was reduced to the limit of detectability. A mathematical model was developed, from which constants were calculated characterizing the reac-tions. The resulting data will permit the design of prototype treatment equipment for the removal of pesticides from effluents or potable water. (Davi-son. IPA) W79-02799

PCBS WATER ELIMINATION/REDUCTION TECHNOLOGY AND ASSOCIATED COSTS, MANUFACTURERS OF ELECTRICAL CAPACITORS AND TRANSFORMERS,

Versar, Inc., Springfield, VA.

R. Durfee.

Available from the National Technical Information Service, Springfield, VA 22161, Price codes: A03 in paper copy, A01 in microfiche. Addendum to Final Report, Task II, Report No. EPA 440/9-76-020, July 2, 1976. 39 p, 2 fig, 9 tab, 8 ref. 68-01-3259.

Descriptors: *Waste pollution sources, *Industrial wastes, *Polychlorinated biphenyls, *Waste identification, Industrial plants, Cooling water, Water pollution, Water pollution control, Vacuum pumps, Waste water, Cost analysis, Estimated costs, Discharge(Water), Cost comparison, Waste

The quantities and sources of the waste waters within the askarel capacitor and transformer manufacturing industry are summarized. Waste waters containing measurable quantities of PCBs are dis-

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Group 5D-Waste Treatment Processes

charged at seven point sources: (1) non-contact cooling water; (2) water-sealed vacuum pumps and steam-jet ejectors; (3) detergent washing of components and assemblies; (4) boiler blowdowns, air conditioning condensates, and contact cooling water; (5) contaminated process wastewaters; (6) sanitary and personal hygiene waste waters; and (7) the wet scrubber for the waste incinerator flue (f) the west schooler for the waste inclinator line gas at one plant. Technologies for eliminating these discharges are described, and a method for estimat-ing the costs of this elimination is presented. Esti-mated costs to achieve zero discharge on an industry wide basis extrapolated from survey data of eight plants are tabulated. The technologies and costs for eliminating PCB contamination of rainwater runoff from storage and material transfer areas of these plants are discussed. Three alternate areas of these plants are discussed. Three antennae approaches for the reduction of PCBs in the direct discharges of these plants and their estimated costs are presented. The selected approaches offer a range of PCB controls at various cost levels. (Davison-IPA) W79-02800

CONTAINER CORPORATION OF AMERICA BREWTON MILL-CONECUH-ESCAMBIA RIVER BASIN STUDY II,

Environmental Protection Agency, Atlanta, GA.

Environmental Protection Agency, Atlanta, GA. Surveillance and Analysis Div. Available from the National Technical Information Service, Springfield, VA 22161 as PB-213 301, Price codes: AO4 in paper copy, AO1 in microfiche. Progress Report, November 1971. 52 p, 10 fig, 6 tab, 4 append.

Descriptors: *Industrial wastes, *Waste water treatment, *Water pollution abatement, *Water pollution sources, Bleaching wastes, Chemical wastes, Pulp wastes, Pulp and paper industry, Waste treatment, Effluents, Aeration, Oxidation, Water chemistry, Liquid wastes, Suspended solids, Organic wastes, Container corporation of America, Conecuh-Escambia River Basin, Alabama, Biochemical oxygen demand.

An evaluation of the waste treatment at Container Corporation of America's (CCA) Integrated Pulp and Paper Mill located at Brewton, Alabama, is reported. A previous report, 'Effect of Pollution on Water Quality, Escambia River and Bay, Florida' identified Brewton Mill as the major source ida' identified Brewton Mill as the major source point of carbonaceous wastes discharged into the Conecuh-Escambia River and recommended re-moval of 90% of the carbonaceous waste generat-ed by this mill. The pollution abatement program initiated by CCA included the addition of a 22-acre aeration basin using ten-75 horsepower aerators. Existing operating treatment units included a clarifier, liquid oxygen application, oxidation pond, and ponding in six natural lakes. Unbleached pulp processing wastes amounting to 17.2 mgd is routed ponding in six natural lakes. Unbleached pulp processing wastes amounting to 17.2 mgd is routed through the treatment units; bleachery waste and woodyard drainage of 17.3 mgd are treated only by the natural lakes. A comparison of study results of the August 1970 and June 1971 surveys is presented. Nine specific conclusions drawn from the present study indicate: that BOD5 reductions are in excess of the recommended 90%; secondary treatment and improved in-plant controls reduced the discharged effluent to less than half of the recommended 4,850 pounds per day limit; CCA has not complied with the recommendation of secondary treatment for bleach plant and woodyard wastes; all waste loadings were reduced; and dyard wastes; all waste loadings were reduced; and ayatu wastes; ail waste loadings were reduced; and measurements of water parameters indicated relatively good water quality in the Conecuh-Escambia River tributaries. Water quality data obtained during the June and July 1971 survey are tabulated. (Davison-IPA) W79-02804

STUDY ON POWER-LAUNDRY WASTEWATER TREATMENT, Army Mobility Equipment Research and Development Center, Fort Belvoir, VA. Sanitary Sciences

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A008 332, Price codes: A05 in paper copy, A01 in microfiche.

Final Technical Report No. 2118, November 1974. 89 p, 22 fig, 28 tab, 7 ref, 8 append. 1G763702DK39-31.

Descriptors: *Waste water treatment, *Laundering, *Water pollution abatement, *Water purification equipment, Water chemistry, Polyelectrolytes, Trace elements, Water quality, Biochemical oxygen demand, Activated carbon, Heavy metals, Laboratory tests, Polymer, Suspended solids, Effluents, Detergents, Cation adsorption, Sampling.

An evaluation of the effectiveness of a waste water treatment process utilizing powdered, activated carbon, a cationic polyelectrolyte, and a modified, standard military water-purification unit (ERD Lator) for the treatment of commercial-type (power) laundry waste waters is reported. Field tests were carried out at Sterling Laundry, Washington, D.C. The following laboratory analyses were performed: turbidity, hydrogen and ion concentration (pH), detergents, biochemical oxygen demand (BOD), conductivity, total organic carbon (TOC), suspended solids, hexane solubles, and heavy metals, including mercury, antimony, copper, lead, zinc, chromium, silver, iron and nickel. It is concluded that: (1) the carbon/polymer/ERD Lator process effectively restores power-laundry effluents to a suitable quality for reuse or discharge into navigable waters, complying with proposed Environmental Protection Agency effluent limitation guidelines; (2) the fluctuations in the chemical characteristics of these waste waters does not affect the quality of the restored water; and (3) pH or total dissolved solids are not significantly changed by the process. (Davison-IPA) W79-02807

EFFECTS OF WASTEWATER PROCESS OPERATION ON ORGANICS IN POTABLE WATER SUPPLIES,

Tennessee Technological Univ., Cookeville. Dept. of Civil Engineering.
C. Aemisegger, W. P. Bonner, R. B. Bustamante, and R. W. Lowhorn.

and R. W. Lowhorn.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 340,
Price codes: A06 in paper copy, A01 in microficher
Tennessee Water Resources Research Center University of Tennessee, Knoxville. Research Report
No. 68, December, 1978. 109 p. 33 fig. 5 tab, 77 ref.
OWRT A-048-TENN(1), 14-54-0001-8045.

Descriptors: *Rotating biological contractors, *Ni-trification, Organic compounds, Water supply, Po-table water, *Biological treatment, Films, *Chemi-cal oxygen demand, Waste water treatment, *Re-fractory compounds, Treatment facilities, Perform-

The primary purpose was to ascertain whether the soluble chemical oxygen demand (COD) discharged from a typical film-type biological treatment plant is residual or refractory in orgin and the extent to which nitrification takes place. This research should also determine where and under what conditions transformations between residual and refractory compounds occur in biological film treatment units. The experimental work was conducted on a 16 stage laboratory scale rotating biological contactor typical of fixed film-type treatment processes. Feed consisted of a chemically defined source of carbon, glucose, plus essential nutrients and trace metals. Soluble COD, glucose, ammonia, nitrite, nitrate and specific low molecummonia, nitrite, nitrate and specific low molecu ammona, nutrie, nutrate and specific low molecular weight voltile organics were determined as a function of treatment stage, pH, and rotational speed. The soluble organics in the effluent of the laboratory scale treatment unit were refractory and consisted of detectable quantities of acetic and propionic acids and other organics exhibiting a propionic acids and other organics exhibiting a COD. Under normal operating conditions the soluble COD varied inversely with contact time and rotational speed. COD removals of between 85 and 93% were obtained. Under adverse pH conditions typical of treatment plant malfunction or misoperation, ie. low pH, the soluble COD through the treatment plant decreased to a minimum between stages 6 and 10 and then increased through stage 16. Nitrification was suppressed at higher rotation-

al speeds and with an increase in the ionic strength of the solution. W79-02815

MICROBIOLOGICAL CONSIDERATIONS OF OZONE TREATMENT OF REUSE WATER IN OZONE TREATMEN FISH HATCHERIES.

Idaho Univ., Moscow P. J. Colberg.

P. J. Colberg.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 342, Price codes: A04 in paper copy, A01 in microfiche. MS Thesis, August 1977. 65 p. 15 fig. 26 ref. OWRT A-053-IDA(1), 14-34-0001-7027/7028.

Descriptors: Fish, Fish hatcheries, *Fish diseases, Fish populations, *Ozone, Carbon, Ammonia, Nitrites, Water chemistry, Nitrification, Disinfection, *Ozonation, Water reuse, *Fish pathogens, Bacteria, Waste water treatment, Micorbiology, Oxida-

The effectiveness of ozone as an alternative to current ultraviolet disinfection of makeup water current ultraviolet disinfection of makeup water and its potential for treatment of recycled water in commercial reuse hatcheries was considered. Comparative survival rates in water were established for four bacterial fish pathogens (Aeromonas saluononicida, Aeromonas liquefaciens, Pseudomonas fluorescens, and the causative agent of Hagerman Redmouth Disease) and spores of BAcillus polymyxa during batch and continuous flow ozonation in the laboratory. Greater than 99% mortality of the fish pathogens was observed within 60 seconds contact during continuous flow exposure at all concentrations of ozone applied. Spores of B. polymyxa were resistant at a residual concentration of 1.0 mg/l. The oxidation of the combined bacterial protozona biomass closely approximated oxidation protozoan biomass closely approximated oxidation rates established for the pure culture studies with no significant difference in relative survival rates no significant difference in relative survival rates between bacteria and protozoa. Increased ozone concentrations caused increased mortaity rates, while elevated carbon levels did not appear to exert a preferential ozone demand when added to suspensions of test organisms. Results of the survival studies refute 'all-or-none' phenomenon reportedly associated with ozone treatment. (Trihey-Idaho)
W79-02823

ANAEROBIC DIGESTION AND REVERSE OS-MOSIS SEPARATION FOR THE TREATMENT OF DOMESTIC LIQUID WASTE,

Thayer School of Engineering, Hanover, NH. J. M. S. Brown.

J. M. S. Brown.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 329, Price codes: A09 in paper copy, A01 in microfiche. M.S. Thesis, August 1975. 170 p. 26 fig. 17 tab, 61 ref. OWRT A-034-NH(1), 14-31-0001-5029.

Descriptors: Sewage effluents, Sanitary engineering, *Semipermeable membranes, *Reverse osmosis, *Anaerobic digestion, Domestic wastes, Membranes, Membrane processes, *Waste water treatment, *Digesters, Environment, Pollution.

A new system employing a semipermeable membrane to process home sewage is proposed. The waste water from the home is treated in a three stage tank which acts as an anaerobic digestor and a settling chamber. The effluent is then pumped under pressure to a unit containing a semipermeable membrane. The nutrients and the microorganisms are retained by the membrane and returned to the direct. These solutions of the membrane and the microorganisms. isms are retained by the membrane and returned to the digester. The product of the membrane unit can be disposed into the environment without fur-ther treatment. The research indicates that (1) the digester will operate properly at the higher organic and mineral load which results from operation in conjunction with the membrane unit, (2) the efflu-ent of the system may be disposed into the environ-ment without fear of pollution, (3) cyclic operation consisting of short pressurized and depressurized periods will reduce concentration polarization at low bulk flow velocities, (4) the cellulose acetate membrane will maintain its integrity for at least a year while processing septic effluent. Full scale protefurth W79 DES

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Waste Treatment Processes—Group 5D

prototype testing is the recommended action for further development.

DESALINATION TECHNOLOGY TRANSFER

Fairleigh Dickinson Univ., Teaneck, NJ. Coll. of Science and Engineering.
For primary bibliographic entry see Field 3A.
W79-02840

COAGULATION OF MONODISPERSE COL-LODAL PARTICLES IN LOCALLY ISOTROP-IC TURBULENT FLOWS,

IC TURBULENT FLOWS,
Massachusetts Inst. of Tech., Cambjridge. Dept. of
Mechanical Engineering.
R. F. Probstein, and M. A. Delichatsios.
Available from the Natinal Technical Information
Service, Springfield, VA 22161 as AD-A041 479,
Price codes: A02 in paper copy, A01 in microfiche.
Omaggio A Carlo Ferrari, Torino (Italy), p 635-642, December 1974. 2 fig, 6 ref. ONR-N00014-67-A-0204-0057.

Descriptors: *Coagulation, *Colloids, *Waste water treatment, *Model studies, Mathematical models, Laboratoryf tests, Flow, Turbulent flow, Particle size, Pipe flow, Colloidal particles, Desta-

This study was an attempt to obtain a better understanding of how dispersed colloidal particles coagulate into larger size flocs under the action of a turbulent flow field. It was anticipated that the information developed on the physiochemical hydrodynamics of this process would lead to the more efficient design of wastewater treatment systems where coagulation of colloidal particles is normally a prerequisite to filtration, sedimentation, or flotation. (Sims-ISWS) W79-02873

FEASIBILITY OF REMOVING PHENOLS FROM SURFACE WATERS BY CARBON ADSORPTION,

SORPTION,
Louisville Univ., KY. Dept. of Civil and Environmental Engineering.
J. S. Zogorski, and S. D. Faust.
In: Proceedings, Second World Congress, International Water Resources Association, New Delhi, India, December 1975, Vol. II, p 89-97. OWRT A-033-NJ(3), 14-31-0001-4030.

Descriptors: Water quality, *Water quality control, *Waste water treatment, *Phenols, *Activated carbon, Odor, Taste, Water treatment, Adsorption, Carbon adsorption.

tion, Carbon adsorption.

Historically, the design of granular activated carbon has been concerned primarily with hydraulic consideration. Presently, individuals who are designing activated carbon systems are becoming more aware of the necessity of evaluating the chemical and physical aspects inherent in the adsorption process. Adsorption is a physiochemical process. Consequently, the design and operation of activated carbon units cannot be optimized unless the physical and chemical aspects of the adsorption process are also considered. Physical and chemical parameters associated with the adsorbate, adsorbent and experimental system were evaluated for their influence on the adsorption of phenols with activated carbon. Characteristics evaluated included temperature, solubility of adsorbate, type of adsorbate, concentration of adsorbate, extent of protolysis, carbon particle size, depth of adsorbat and linear velocity. A qualitative summary of these physiochemical parameters on the operation efficiency of a fixed-bed carbon was developed. In addition, the overall feasibility of removing phenols from aqueous solution by carbon adsorption is presented.

W79-02880 presented. W79-02880

AEROBIC DIGESTION OF WASTEWATER SLUDGE UNDER LOW TEMPERATURE CON-

New Hampshire Univ., Durham. Dept. of Civil

D I. Bishop

P. L. Bishop.

A vailable from the National Technical Information
Service, Springfield, VA 22161 as PB-291 519,
Price codes: A06 in paper copy, A01 in microfiche.
Water Resource Center, Univ., of New Hampshire
Research Report No. 18, 1978. 115 p. 23 fig. 12 tab,
64 ref. OWRT A-037-NH(3), 14-31-0001-4029.

Descriptors: *Waste water treatment, *Aerobic digestion, *Aerobic treatment, *Sludge digestion, *Temperature, Activated sludge, Mixing, Phosphorus, Digestion, Nutrients, Sludge, Sludge treatment, Filtration, Sewage treatment, Digestion, Batch reactors, Continuous flow reactors, Settleability, Filterability, Volatile solids, Oxygen uptake, Primary sludge, Secondary sludge, Nutrient transformations.

The main purposes were to investigate the effect of cold temperatures (5 to 30C) on the aerobic digestion process, and the fate of nutrients (nitrogen and phosphorus) in the sludge during digestion. Studies were performed using primary sludge from two locations and waste activated sludge from two others; both batch and continuous flow reactors were used. The effect of temperature on digestion operation and digestion kinetics was determined by operating digesters at varying temperatures, detention times and loading rates, and analyzing for both solids and organic destruction. Changes in settleability and filterability of the sludge were also measured. Nutrient transformations during digestion were determined by maintaining a nutrient mass balance during the aerobic digestion process. W79-02911

PCBS INVOLVEMENT IN THE PULP AND PAPER INDUSTRY,
For primary bibliographic entry see Field 5B.
W79-02920

WASTEWATER DISINFECTION IN CANADA. Canadian Environmental Protection Service, Economic and Technical Review, Report No. EPS 3-WP-78-4, 99 p, May, 1978. 172 ref, 7 tab, 3 append.

Descriptors: *Waste water(Pollution), *Disinfection, *Canada, Effluents, Wastes, Waste treatment, North America, Foreign countries, United States, Europe, Chlorination, Water purification, Water quality control, Diseases, Chlorine, Byproducts, Microorganisms, Costs, Environmental effects, Aquatic microorganisms, Aquatic life, Water treatment, Public health, Human pathology.

This report summarizes existing waste water disinfection requirements throughout Canada, and in the U.S.A. and Europe. The effectiveness of chlorination in combatting the spread of waterborne disease is assessed, and the possible effects of residual chlorine and chlorination by-products on man and aquatic species are discussed. Disinfection alternatives are reviewed with respect to their effectiveness in reducing pathogens, availability, relative costs, environmental impact, and other practical considerations. The protection of both public health and the environment must be taken into account when formulating policies and criteria for waste water disinfection. (Witt-IPC)

PAPER PULP COMPOUNDS CONTAINING ACTIVE SLUDGE, Soviet Patent SU 440468. Issued January 31, 1975. Soviet Inventions Illustrated, Vol. W, No. 27, p F1-F2, August 12, 1975.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, Patents, *Activated sludge, Recycling, Sludge disposal, Economics, *Pulp wastes, Cardboard, Punch resistances, Ring

A process for using the waste activated sludge from pulp and paper processing effluent treatment plants in packaging materials manufacturing has been patented. Activated sludge from a plant for the biological purification of waste water from a

paper and pulp factory is added to paper pulp (for economy and improved strength) in the following proportions: fibrous components, 8-95 percent; and, activated sluge, 5-20 percent. The sludge is added to the ground and sized fibrous mass as it is passed to the mixer pump, before pouring. Unbleached sulfate celluose 24 degrees Schopper-Riegler was sized with rosin precipitated with clay. Prior to pouring, activated sludge suspension with a concentration of about 20 g/liter was added to the cellulose pulp (to the extent of 5 percent of the dry fiber weight). Cardboards weighing 200 g/s qm and 260 g/s qm were poured. The respective punch resistances were 8.1 and 9.95 kg/sq cm, and the respective ring compression values were 2.51 and 3.38 kg. Without the addition of activated sludge, the respective punch resistances were 6.9 and 9.2 kg/sq cm, and the respective ring compression values were 6.9 and 3.4 kg. (Orr-FIRL)

DSORBENT FOR INDUSTRIAL EFFLUENTS

PREFERABLY CONTAINING DYES, Belgian Patent BE-821-941. Issued May 7, 1975. Derwent Belgian Patents Report, Vol. W, No. 21, p D1, July 1, 1975.

Descriptors: *Waste water treatment, *Patents, *Industrial wastes, Tanneries, Textiles, Pulp and paper industry, Dyes, Adsorption, Activated carbon, Chemical precipitation, Polymers.

An adsorbent has been patented for the treatment of aqueous industrial wastes particularly from the treatment baths in the textile, paper, or leather industries or from dye or optical whitener manufacturing. The adsorbent contains a support pretreated with precipitating agents and activated carbon. The supports are synthetic plastics, mineral fillers such as cellulosic materials and mixtures of these. The precipitating agent is preferably a basic nitrogen polymer, such as a polyamine-polyamine from a fatty acid polyaleyleneimine. The precipitating agent may be associated with a polyanionic polymer, prticularly an alpha, beta-ethylenic unsaturated acid, or a polyvalet metal salt or both. The treatment is performed at 10 to 150 C, but preferably between 30-100 C, with the adsorbent in the form of a filter. Adsorbents may also contain preterably between 30-100 C, with the adsorbent in the form of a filter. Adsorbents may also contain from 2 to 95 percent activated carbon, especially 10-70 percent carbon. The mixture of the adsorbents has a greater adsorbing power than carbon alone and is an efficient and economical water treatment process for the above type of effluents. (Orr-FIRL) W79-02943

COLOUR AND TOXICITY REMOVAL FROM BLEACH PLANT EFFLUENTS USING A HIGGINS CONTACTOR,

Atlantic Analytical Services Ltd., St. John (New Brunswick).

Brunswick).
W. J. Wilson, J. T. Wearing, and S. M. Miller.
Canadian Environmental Protection Service,
Ottawa, Ontario K1A 1C8, Cooperative Pollution
Abatement Research (CPAR) Project Report 5441, March, 1977. 47 p. 5 fig, 17 ref, 16 tab.

Descriptors: *Bleaching wastes, *Waste water treatment, *Decoloring, *Detoxification, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Color, Toxicity, Pulp wastes, Pulp and paper industry, Adsorption, Biochemical oxygen demand, Fish, Flow rates, Hydrogen ion concentration, Solids contact processes, White liquor(Kraft process), Kraft mills.

Adsorption of bleached kraft mill effluents (chlor-ination-stage and alkaline extraction waste liquors) on Amberlite XAD-8 achieved color removals of 70 to 85% in addition to BOD reductions and excellent toxicity removal, the treated effluents being nontoxic to fish at 100% concentration. The adsorbent's efficiency depended on flow rate, being better at low flow rates. The alkaline extraction effluent had to be adjusted to pH 2.5 (similar to that of the chlorination-stage effluent) before adsorption became effective. Of two regenerant Adsorption of bleached kraft mill effluents (chlor-

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Group 5D-Waste Treatment Processes

streams tested, white liquor was effective, but chlorine dioxide generated effluent was not. Pres-ent operating data indicate that the use of a Higgins continuous countercurrent contactor offers no significant advantage over a fixed-bed system. (Brown-IPC) W79-02953

5E. Ultimate Disposal Of Wastes

EVALUATION OF THE MC-300A SOIL MOISTURE METER TO DETERMINE IN-PLACE MOISTURE CONTENT OF REFUSE AT LAND DISPOSAL SITES.

DisfOSAL SITES, Environmental Protection Agency, Cincinnati, OH. Solid Waste Management Office. For primary bibliographic entry see Field 5A. W79-02503

THE U-TUBE FOR WATER AERATION.

Rocketdyne, Canoga Park, CA. For primary bibliographic entry see Field 5D. W79-02506

THE CONTAMINATION OF GROUNDWATER BY HEAVY METALS FROM THE LAND DIS-POSAL OF FLY ASH,

Notre Dame Univ., IN. Dept. of Civil Engineer-

For primary bibliographic entry see Field 5B.

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES, UNITED STATES STEEL CORPORATION, IRVIN PLANT, PITTSBURGH, PENNSYLVANIA, PLANT, PITTSBU AUGUST 18-28, 1975.

Enforcement Investigations Center. National Denver, CO.

For primary bibliographic entry see Field 5B. W79-02515

FEASIBILITY OF THE FUNCTIONAL USE OF VEGETATION TO FILTER, DEWATER AND REMOVE CONTAMINANT FROM DREDGED MATERIALS.

Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab. C. R. Lee, R. E. Hoeppel, P. G. Hunt, and C. A.

Carlson.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 336 Price codes: A05 in paper copy, A01 in microfiche. Final Report No. WES-TR-D-76-4, June 1976. 86 p, 12 fig, 9 tab, 137 ref, 5 append.

Descriptors: *Vegetation, *Vegetation establishments, *Waste dumps, *Waste treatment, Spoil banks, Contaminants, Slurries, Filtering, Dredging material, Heavy metals, Lead, Mercury, Zinc, Nitrogen, Phosphorus, Cadmium, Feasibility, Literature, Water quality, Environmental effects.

Information compiled from a literature review and field observations was examined to determine the feasibility of using vegetation to filter, dewater and remove contaminants from dredged material slurry remove contaminants from dredged material slurry and effluent from confined disposal areas. Dredged material and potential vegetative colonizers from freshwater, brackish, and saline environments were considered in six U.S. geographical areas. Natural vegetation inside the disposal sites and the surrounding vacinities were identified, and a summary was compiled to provide a listing of plants for potential propagation on disposal sites. Conclusions resulting from the study include: the quality of discharge water from contaminated areas would of discharge water from contaminated areas would be improved by the physical and chemical interac-tions of the vegetation with the dredged slurry; significant amounts of nitrogen and phosphorus could be removed from discharge waters by utiliz-ing selected vegetation; feasibility is limited in the use of selected vegetation to remove heavy metal pollutants from dredged material; use of vegetation should be restricted if dredged sediment contain high levels of mercury, lead, or cadmium, as con-

tamination by these elements precludes the use of the area as wildlife habitats; use of vegetation to dewater and consolidate fine textured dredged material is feasible; native plant species should be used if possible; the practicality of establishing and using vegetation will depend on the projected use of the area or the dredged material contaned therein. It recommended that natural vegetation within a site be left intact, and the potential for contamination of the food chain by concentrations of the contaminants be evaluated. (Davison-IPA) W79-02517

AN ASSESSMENT OF THE OCCURRENCE OF HUMAN VIRUSES IN LONG ISLAND AQUAT-

IC SYSTEMS,
Brookhaven National Lab., Upton, NY.
For primary bibliographic entry see Field 5C.
W79-02584

CONSEQUENCES OF LEACHING FROM PULP AND PAPER MILL LANDFILL OPERATIONS.

Econotech Services Ltd., New Westminster (Brit-

For primary bibliographic entry see Field 5B. W79-02591

A FIELD STUDY OF TREATMENT VS. DEPTH OF SAND FILL IN A MOUND SYSTEM, Maine Univ. at Orono, Land and Water Resources

For primary bibliographic entry see Field 5D. W79-02604

BASELINE REPORT OF ENVIRONMENTAL CONDITIONS IN DEEPWATER DUMPSITE VOL I: PHYSICAL CHARACTERISTICS.

National Ocean Survey, Rockville, MD.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-272 578,
Price codes: All in paper copy, A01 in microfiche.
NOAA Dumpsite Evaluation Report 77-1, June 1977, 232 p.

Descriptors: *Continental shelf, *Waste disposal, Descriptors: "Continental shell, "Waste disposal, 'Industrial wastes, 'Environmental effects, Base-line studies, Climate, Delaware, New York, Water quality control, "Outer Continental Shelf, "Ocean dumping, New York Bight, Physical oceanog-

The results of field studies conducted by NOAA in and about the Deepwater Dumpsite 106 (DWD-106), approximately 106 nautical miles from Ambrose Lightship and 90 nautical miles due east of Cape Henlopen, Delaware, are given in this baseline report, for the purpose of characterizing the site's environment and biota. The Baseline Report is divided into three sections: Physical Characteristics which appear as volume 1, Biological Characteristics, volume 2, and Contaminant Inputs and Chemical Characteristics, volume 3. An Appendix, containing results too detailed for the main body of the report is included in volume 3. Characterization results are chiefly from three baseline cruises, but also from data obtained during two summer 1976 experimental cruises, as well as from National 1976 experimental cruises, as well as from National Marine Fisheries Service sources. This volume contains the following studies: Deepwater Dump-site 106, bathymetry and bottom morphology; Six dives to the lower continental slope and upper continental rise southwest of Hudson Canyon continental rise southwest of Hudson Canyon - geological aspects; General physical oceanography of Deepwater Dumpsite 106; Physical Oceanography of Deep Deepwater Dumpsite 106, update July 1975; Physical oceanography of Deepwater Dumpsite, February - March 1976; and Climatic study of New York Bight. (See also W79-02623) (Sinha-OEIS) W79-02622

BASELINE REPORT OF ENVIRONMENTAL CONDITIONS IN DEEPWATER DUMPSITE 106, VOLUME II: BIOLOGICAL CHARACTER-ISTICS

National Ocean Survey, Rockville, MD.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 579, Price codes: A12 in paper copy, A01 in microfiche. NOAA Dumpsite Evaluation Report 77-1, June 1977. 271 p.

Descriptors: *Continental Shelf, *Waste disposal, *Industrial wastes, *Environmental effects, Baseline studies, Aquatic animals, Aquatic plants, Ecology, Water quality control, New York, Delaware, *Outer Continental Shelf, *Ocean dumping, New York Bight, Biological oceanography.

Biological data obtained on the baseline cruises provided limited quantitative coverage of the region. Together with other available data, this also sufficed to provide a qualitative biological overview of the region. A complete picture is not yet available and distinguishing dumping effects from natural variations will continue to be a problem. This volume contains the following studies: Phytoplankton in the vicinity of Deepwater Dumpsite 106; Deepwater Dumpsite 106 - Zooplankton studies; Gelatinous zooplankton at Deepwater Dumpsite 106, Spex predators in DWD 106, Distribution and abundance of mesopelagic fishes on cruises 2 and 3 at DWD 106; Observations from DSRV ALVIN on populations of benthic fishes and selected larger invertebrates in and near DWD-106; Epibenthic invertebrates; Epifaunal megabenthos in DWD 106; Final report on benthic infauna of DWD 106 and adjacent areas; and Neuston fish at DWD-106. (See also W79-02622)(Sinha-OEIS) W79-02623

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NUTRIENTS, TOXINS, AND WATER IN TERRESTRIAL AND AQUATIC ECOSYSTEMS TREATED WITH SEWAGE PLANT EFFLUENTS - FINAL REPORT OF THE UPLAND RECHARGE PROGRAM,
Marine Biological Lab., Woods Hole, MA.
For primary bibliographic entry see Field 5D.
W79-02638

A HIGH-EFFICIENCY THERMAL DRYING SYSTEM, V. Maffet.

In: Proceedings of the First International Symposium on Drying, August 3-5, 1978, McGill University, Montreal, Canada, Science Press, Princeton, p 147-151. 2 fig.

Descriptors: *Sludge treatment, *Dewatering, *Drying, *Dryers, Wastes, Sludge, Air pollution control, Venturi scrubbers, Electrostatic precipitators, Turbulent-Contact absorbers, Solid wastes, Water pollution sources.

The system described is a toroidal dryer suitable for the dewatering of effluent sludges and similar waste materials, and also of heat-sensitive goods, with minimum damage. Air-pollution control equipment for installation on such a drying system is also discussed, including venturi scrubber, electrostatic precipitator, and turbulent-contact absorber. (Brown-IPC) W79-02675

POLYMER COAGULATION OF HUMIC ACID WATERS,

Clarkson Coll. of Technology, Potsdam, NY. Dept. of Civil and Environmental Engineering. For primary bibliographic entry see Field 5D. W79-02715

A FRESH WATER WASTE RECYCLING AQUACULTURE SYSTEM, Harbor Branch Foundation, Inc., Fort Pierce, FL WASTE RECYCLING-

For primary bibliographic entry see Field 5D. W79-02759

HAZARDOUS WASTE DISPOSAL DAMAGE REPORTS, DOCUMENT NO. 3. Environmental Protection Agency, Washington, DC. Office of Solid Waste Management Programs. Available from the National Technical Information

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Ultimate Disposal Of Wastes-Group 5F

Service, Springfield, VA 22161 as PB-261 156, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA/530/SW-151.3, June 1976. 20 p.

Descriptors: Publications, *Environmental effects, *Public health, *Waste disposal, Contaminants, Aquifers, Landfills, Cattle, Petrochemicals, Pollutant identification, Poisons, Industrial wastes, Sodium compounds, Soil contamination, Water pollution, Air pollution, Economics, Legal aspects, Solid Wastes Disposal Act, New Jersey, Louisiana, Maryland, Water pollution effects.

Three incidents of improper land disposal of hazardous wastes are documented as part of an investigation to determine the impact of such practices on public health and on the environment. The incidents reported are: (1) petrochemical contamination of the Cohansey Aquifer in New Jersey caused by the dumping of drums of liquid chemical wastes between August and September 1971; (2) hexachlorobenzene contamination of cattle in Louisiana discovered in December 1972; and (3) poison fumes resulting from a chemical reaction of industrial waste pollution at a Maryland landfill, causing six men to be hospitalized. (Davison-IPA) W79-02792

DISPOSAL OF DILUTE PESTICIDE SOLU-

Environmental Protection Agency, Cincinnati, OH. Office of Solid Waste Management.

OH. Office of Solid waste Management.

H. R. Day.

Available from the National Technical Service, Springfield, VA 22161 as PB-261 160, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA/530/SW-519, June 1976. 22 p, 1 tab, 18 ref.

Descriptors: *Pesticide disposal, *Waste disposal. *Ultimate disposal, Dilution, Waste treatment, Waste dumps, Waste storage, Lagooning, Incineration, Biodegradation, Chemical degradation, Filtration, Photodecomposition, Soil disposal fields, Soil bacteria, Regulations, Costs.

A compilation of current information on the disposal of excess dilute pesticide solutions is presented. These solutions include unused spray, container rinsate, equipment washings, and spill clean-ups which are equal to or less than the recommended application concentration. Current disposal practices include: use as a dilutant for spray mixtures; holding tanks, disposal pits, and dry wells; soil injection; chemical detoxification; incineration; photodecomposition; batch biodegredation; and special land disposal sites designed to avoid groundwater contamination. It is believed that use as a dilutent for spray mixtures; is the most reliable groundwater contamination. It is believed that use as a dilutent for spray mixtures is the most reliable and desirable disposal method, but the choice of method depends on the nature of the pesticide, its concentration, local disposal costs, and destruction assurance. A summary of the Federal regulatory efforts regarding pesticide disposal, and current research on disposal methods is given. (Davison-IPA) W79-02795

OXIDATION OF PESTICIDES BY OZONE AND ULTRAVIOLET LIGHT,

Houston Research, Inc., TX. For primary bibliographic entry see Field 5D. W79-02799

HANDBOOK FOR PESTICIDE DISPOSAL BY COMMON CHEMICAL METHODS,

TRW Systems, Inc., Redondo Beach, CA.
C. C. Shih, and D. F. Dal Porto.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 864, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA/530/SW-112C, December 1975. 103 p, 18 tab, 91 ref, 4 append. 68-01-2956.

Descriptors: *Pesticide disposal, *Chemical degradation, *Landfills, *Decontamination solution, Alkali treatment, Personal protection, Disposal methods, Phosphorus compounds, Nitrogen com-

pounds, Chlorine compounds, Diazinon, Toxicity, Pesticides, Water pollution, Neutralization.

Pesticides, Water pollution, Neutralization.

An in-depth investigation of twenty key pesticides, representative of the major pesticide classes, was conducted to develop procedures advising pesticide users of safe, readily available chemical methods for pesticide disposal. Selection, based on production volume and toxicity, included the suitability of a pesticide's chemical structure in representing the chemical class, persistence in the soil, mobility and solubility in water. A literature review and information provided by pesticide manufacturers determined that alkali treatment is an effective environmentally safe method for disposal of naled, diazinon, Guthion, malathion, carbaryl, captan, and atrazine. No practical chemical degradation/detoxification methods were indicated for disposal of Dursban, methyl parathion, maneb, alachlor (Lasso), diuron, picloram, trifluralin, methoxychor, chlordane, toxaphene, 2,4-D, amiben (chloramben), and pentachlorophenol. The recommended procedure for pesticide disposal is discussed in terms of personal protection, chemical detoxification by alkali treatment, pesticide container decontamination procedure, and alternate methods for disposing of small quantities of selected pesticides. An extensive list of references is included. (Davison-IPA) W79-02806 W79-02806

WASTE DISPOSAL STUDY, EVALUATION OF METHODS TO RECOVER REUSABLE CHEMICALS FROM EVAPORATED PHOTOWASTES.

Computerized Pollution Abatement Corp., Leicester, NY. Pollution Abatement Div. G. A. Lorenzo, and T. N. Hendrickson.

G. A. Lorenzo, and I. N. Hendrickson. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 767, Price codes: A04 in paper copy, A01 in microfiche. Final Report No. AFAL-TR-76-75, September 1976, 60 p, 10 fig. 12 tab, 6 append. F33615-74-C-

Descriptors: *Photography wastes, *Waste water treatment, *Recycling, *Chemical wastes, Waste reclamation, Sodium compounds, Sulfur compounds, Sulfite liquors, Sewage treatment, Industrial wastes, Evaporation, Sulfonates.

The feasibility of recovering certain chemicals for reuse from evaporated photoprocessed wastes was investigated. Priority consideration was given to the reclamation of all or part of the chemical waste rendering it suitable for use by a part of the industry able to absorb all of these chemicals. Other factors included the conversion of all or a portion of the wastes into: (1) insoluble materials of conof the wastes into: (1) insoluble materials of construction; (2) harmless gases for release into the atmosphere; and/or (3) a form acceptable to conventional sewage treatment plants. It is concluded that sodium thiosulfate and sodium sulfite can be reclaimed for evaporated photographic wastes, with a recovery of 35% to 90% for sodium thiosulfate and 10% to 60% for sodium sulfite. Recovery of the developers with a processing and along the developers with as budgers and along the developers. fate and 10% to 60% for sodium sulfite. Recovery of the developers, such as hydroquinone and elon, is economically impractical because they are present in low concentrations. Converson of sulfonated developers to recyclable quinone can be accomplished in low yields. Acetic acid or sodium acetate can be reclaimed by conversion to butyl acetate followed by distillation. Baron, phosphorus, silver, iron, and cadmium, present in small amounts, are not practical to recover. The reclamation procedure for thiosulfate and sulfite is cost effective. Best recovery efficiencies are realized when sodium thiosulfate concentrations is more than 50% of the total waste. (Davison-IPA) W79-02809

RESIDUAL MANAGEMENT BY LAND DIS-POSAL, PROCEEDINGS OF THE HAZARD-OUS WASTE RESEARCH SYMPOSIUM.

Arizona Univ., Tucson. Dept. of Soils, Water and

Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 768, Price codes: A13 in paper copy, A01 in microfiche. Report No. EPA-600/9-76-015, July 1976. Sympo-

sium held at Arizona Univ. Tuscon, Arizona, Febr. 2-4, 1976. 281 p, 135 fig, 79 tab, 194 ref. 804330.

Descriptors: *Hazardous wastes, *Conferences, *Solid wastes, *Waste disposal, Landfills, Municipal wastes, Industrial wastes, Hazards, Sampling, Pollution abatement, Chemical wastes, Oil spills, Pollutant identification, Environmental effects, Linings, Trace elements, Pollutant migration, Heavy metals, Pesticides, Leachates.

A compilation of papers on land disposal of municipal and hazardous wastes is presented. The papers are grouped according to the following subject areas: identification of pollution potential, modification of disposal sites and waste streams, special disposal problems, and predicting trace element migration. Major topics include: case studies of actual and potential environmental impact from land disposal of hazardous wastes; technology of preventing adverse environmental impact; selection of disposal sites to reduce adverse impact; identification of the potential pollution within selected industrial solid wastes; and special disposal problems. (Davison-IPA)

SOIL MORPHOLOGIC AND HYDRAULIC CHANGES ASSOCIATED WITH WASTEWATER IRRIGATION,

Pennsylvania State Univ., University Park. Dept. of Agronomy.

For primary bibliographic entry see Field 5G.

THE ACCUMULATION, TRANSLOCATION AND DEGRADATION OF BIOCIDES AT LAND WASTEWATER DISPOSAL SITES: THE FATE OF MALATHION, CARBARYI, DIAZINON, AND 2,4-D BUTOXYETHYL ESTER,

California Univ., Berkeley. Sanitary Engineering

For primary bibliographic entry see Field 5B. W79-02890

CHEMICAL SEWAGE SLUDGE DISPOSAL ON LAND (LYSIMETER STUDIES) VOLUME II, Department of Fisheries and Environment, Ottawa (Ontario). Wastewater Technology Centre; and Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
D. B. Cohen, and D. N. Bryant.

Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No. 79, 128 p, 43 fig, 53 ref, 35 tab. 72-3-6.

Descriptors: *Sewage sludge, *Chemicals, *Sewage disposal, *Lysimeters, Model studies, Leachate, Leaching, Heavy metals, Crops, Nutrient analysis, Sludge digestion, Iron, Lime, Canada, *Alum, *Ontario sludge disposal survey(1975), University of Guelph.

Lysimeter experiments in which crops were grown on agricultural soils treated with anaerobically digested sewage sludges (from plants where phosphorus removal was being practiced using metal salts) were initiated in 1972 and 1973. Alum, iron and lime treated fluid sludges were added to loamy sand and silt loam soils vegetated with orchard grass. Similarly, alum, iron and lime treated airdried sludges were added to sand and clay soils and wheat crops were grown. The high application rates of fluid and air-dried sludges ranged from 32 to 76 and 47 to 144 tons dry wt per ha per yr, respectively. The metal loadings approximated the recommended maxima for Ontario agricultural land. The lower rates were one-third and two-thirds of the high rates. The results of these experiments are presented and compared to results from ments are presented and compared to results from field and greenhouse studies. (WATDOC) W79-02924

SUBLETHAL EFFECTS OF TREATED LIQUID EFFLUENT FROM A PETROLEUM REFINERY ON FRESHWATER ORGANISMS, Sprague (J. B.) Associates Ltd., Guelph (Ontario). For primary bibliographic entry see Field 5C.

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Group 5E-Ultimate Disposal Of Wastes

W79-02929

PAPER PULP COMPOUNDS CONTAINING ACTIVE SLUDGE, For primary bibliographic entry see Field 5D. W79-02941

REEDS CONTROL EUTROPHICATION OF BALATON LAKE.

Research Inst. for Water Resources Development. Budapest (Hungary).
For primary bibliographic entry see Field 5G.
W79-02954

5F. Water Treatment and **Quality Alteration**

EVALUATION OF THE WYOMING WATER SUPPLY PROGRAM.

Environmental Protection Agency, Denver, CO.

Environmental Protection Agency, Denver, CO. Air and Water Programs Div.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 579. Price codes: Al1 in paper copy, A01 in microfiche. December 1972. 250 p, 9 fig, 12 tab, 10 ref, 13 append.

Descriptors: *Water quality control, *Wyoming, *Water quality evaluation, *Water supply, Potable water, Chemical analysis, Public health, Water pollution treatment, Chlorination, Legislation, Bacteria, Aquatic bacteria, Manpower, Budgeting, Surveys, Chemical properties, Manpower, Budgeting.

Results of in-depth studies of 23 public, 13 semi-public, and 127 individual supplies in Campbell, Lincoln, and Natrona Counties, Wyoming, are pre-sented. Of the 23 public water supplies studied: 9% failed to meet manditory chemical drinking water limits; 35% failed to meet recommended chemical drinking water standards, 70% needed additional treatment facilities; 96% were not providing ade-quate disinfection (chlorination); and 96% had op-erators with little or no training in water treatment or systems. Semi-public and individual water sup-plies showed similar results. The adequacy of Wy-oming's Water Supply Program was evaluated on pines showed similar results. The acceptacy of wy-oming's Water Supply Program was evaluated on the basis of surveillance activities, laboratory re-sources, policies, legislation, budget, and manpow-er. Indications are that funds and man-years available are inadequate to support the program effectively. Ten specific recommendations needed for Wyoming to have an effective and responsive Water Supply Program are presented. (Gibson-W79-02512

INTRODUCTION TO THE MODEL STATE INFORMATION SYSTEM (MSIS).

American Management Systems, Inc., Arlington, VA.

For primary bibliographic entry see Field 5G.

SOME IMPACTS OF SAFE DRINKING WATER STANDARDS ON RURAL WATER SYSTEMS, Mississippi State Univ., Mississippi State. Div. of Business Research. For primary bibliographic entry see Field 5G. W79-02522

REPLACEMENT OF METALLIC IMPURITIES FROM WATER BY METAL BEDS, Connecticut Univ., Storrs.

For primary bibliographic entry see Field 5F.

REPLACEMENT OF METALLIC IMPURITIES FROM WATER BY METAL BEDS, Connecticut Univ., Storrs.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 390, Price codes: A03 in paper copy, A01 in microfiche.

M.S. Thesis, 1978. 22 p, 2 tab, 5 fig, 7 ref. OWRT A-063-CONN(1), 14-31-0001-5007.

Descriptors: *Electrochemistry, *Heavy metals, *Water purification, *Corrosion control, Aluminum, Zinc, *Removal efficiency, *Metallic impurities, Deposition products, Fluidization, Economic viability, Magnesium bed.

The use of metallic replacement reactions for noble metallic ion control was shown to be a realistic prospect. Static granular zinc beds were ideally efficient in removing the noble metal ions Hg (+2), Cu (+2), Pb (+2) which are a major source of corrosion in aluminum flow systems. Magnesium beds were effective in replacing the less noble ions Co (+2), Cd (+2), Cr (+2), Ni (+2). They also, however, suffer rapid corrosion limiting their economic viability. Aluminum was found to be essentially inert. Since aluminum and zinc form more protective coatings, it may be found that an essentially inert. Since aluminum and zinc form more protective coatings, it may be found that an Mg-Zn or Mg-Al alloy will corrode less rapidly while still being reactive to less noble ions. The effects of time on the process efficiencies were found to reflect the changing physical characteristics of static beds. Evidence suggested blockage of the bed by the deposition products effectively reduced the apparent size of the bed. Fluidization of the active metal dramatically improved the time characteristics of the removal efficiency while still maintaining a high electrochemical efficiency. (del.are-Conn) W79-02603

CHEMICAL TREATMENT FOR ORGANIC COLOR REMOVAL FROM GROUNDWATERS. Mississippi State Univ., Mississippi State. Dept. of

Civil Engineering.
For primary bibliographic entry see Field 5D. W79-02782

GUIDELINES FOR PUBLIC TECHNICAL WATER SYSTEMS.

Clean Water Consultants, El Dorado Hills, CA. For primary bibliographic entry see Field 5G. W79-02787

EFFECTS OF WASTEWATER PROCESS OPER-ATION ON ORGANICS IN POTABLE WATER

ATION ON ORGANICS IN POTABLE WATER SUPPLIES, Tennessee Technological Univ., Cookeville. Dept.

of Civil Engineering.

For primary bibliographic entry see Field 5D.

W79-02815

FEASIBILITY OF REMOVING PHENOLS FROM SURFACE WATERS BY CARBON AD-SORPTION, Louisville Univ., KY. Dept. of Civil and Environ-

mental Engineering.
For primary bibliographic entry see Field 5D.
W79-02880

WASTEWATER DISINFECTION IN CANADA, For primary bibliographic entry see Field 5D. W79-02935

5G. Water Quality Control

EVALUATION OF MEASURES FOR CONTROLLING SEDIMENT AND NUTRIENT LOSSES FROM IRRIGATED AREAS,

Idaho Agricultural Experiment Station, Moscow D. W. Fitzsimmons, C. E. Brockway, J. R. Busch, L. R. Conklin, and R. B. Long. Publication No. EPA-600/2-78-138, July, 1978. 150 p, 51 fig, 82 tab, 59 ref.

Descriptors: Irrigation, Soil conservation, Water quality, *Salinity, Economic analysis, Management, *Nutrients, *Sediments, *Return flow.

Field studies were conducted in two southern Idaho areas to determine the effects of different management practices on the quality and quantity

of the runoff from surface-irrigated fields. Pollut-ant removal systems (primarily mini-basins, vege-tated buffer strips and sediment retention ponds) were installed at some of the study sites and evalu-ated to determine their effectiveness in removing sediment and other materials from return flows. ated to determine their effectiveness in removing sediment and other materials from return flows. The results indicate that water, sediment and nutrient losses from surface-irrigated areas can be greatly reduced or eliminated by the use of certain types of management practices and/or pollutant removal systems. Linear programming models were used to determine the economic impacts of using different types of practices to control surface runoff and sediment losses from model farms. The results indicate that sediment losses from surface-irrigated fields can be reduced by as much as 50 percent at modest cost. Elimination of surface runoff and sediment losses would require the use of sprinkler irrigation systems and would decrease net income by about 15 percent. Some of the overall impacts of pollutant losses from surface-irrigated areas were evaluated. The annual cost of removing sediment from canals and ditches in the Boise Valley was found to be about \$20 per hectare. Irrigation return flows contribute to water quality problems in the Boise River and downstream in the Snake River. (Skogerboe-Colorado State)

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UPGRADING TEXTILE OPERATIONS TO REDUCE POLLUTION, VOLUME 1: IN-PLANT CONTROL OF POLLUTION.

Environmental Protection Agency, Cincinnati, OH. Office of Technology Transfer For primary bibliographic entry see Field 5D. W79-02504

UPGRADING TEXTILE OPERATIONS TO REDUCE POLLUTION VOLUME 2; WASTEWATER TREATMENT SYSTEMS.

Metcalf and Eddy, Inc., Boston, MA.
For primary bibliographic entry see Field 5D.
W79-02505

FEDERAL GUIDELINES: INDUSTRIAL COST RECOVERY SYSTEMS, MUNICIPAL WASTEWATER TREATMENT WORKS CON-STRUCTION GRANTS PROGRAM.

Environmental Protection Agency, Washington, DC. Office of Water Program Operations.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 651, Price codes: A03 in paper copy, A01 in microfiche. Report No. MCD-45, February 1976. 31 p, 3 tab, 2

Descriptors: *Waste water treatment, *Federal Water Pollution Control Act, *Cost repayment, Cost analysis, Cost allocation, Federal project policy, Grants, Municipal wastes, Construction grants, Treatment facilities.

The Federal Water Pollution Control Act Amendments of 1972 extended the construction grants program and imposed new requirements on grant applicants necessitating guidelines for industrial cost recovery (ICR). General requirements for step 2 (preparation of construction drawings and specifications) and step 3 (fabrication and building of a treatment works) grant applications are sum-marized, and the required documentation for step 3 grant approval is discussed. Other areas covered include: appeal procedure; computation of ICR payments; reserved capacity; exclusions from application of ICR system; ICR examples; new indusplication of ICR system; ICR examples; new industrial user; lump sum ICR payments; state agency reviews; conflicts between local laws and Federal ICR requirements; and implementation of approved ICR systems. It is noted that the appendicies are intended as part of these guidelines and should be used as such. (Davison-IPA)

IDENTIFICATION AND INITIAL EVALUA-TION OF IRRIGATION RETURN FLOW MGDELS,

Irrigation Hydrology Co., Fort Collins, CO.

For primary bibliographic entry see Field 6A. W79-02510

EVALUATION OF THE WYOMING WATER SUPPLY PROGRAM.

Environmental Protection Agency, Denver, CO. Air and Water Programs Div. For primary bibliographic entry see Field 5F. W79-02512

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES, UNITED STATES STEEL CORPORATION, IRVIN PLANT, PITTSBURGH, PENNSYLVANIA, AUGUST 18-28, 1975.

National Enforcement Investigations Center, Denver, CO.

For primary bibliographic entry see Field 5B. W79-02515

FINANCIAL IMPLICATIONS OF WASTE MANAGEMENT SYSTEMS FOR SHELLFISH

PROCESSING,
Georgia Univ., Athens.
R. M. North, and F. M. Lyda.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-256 742,
Price codes: A02 in paper copy, A01 in microfiche.
Report No. NOAA-76042112, December 1975. 8 p,
4 tab, 6 ref. Reprinted from Journal of Agricultural
Economics, December 1975. SG-04-3-158-6.

Descriptors: *Shellfish, *Industrial wastes, *Waste water treatment, *Cost analysis, Shrimp, Economic analysis, Capital costs, Maintenance costs, Operating costs, Replacement costs, Effluents, Biological oxygen demand, Food processing industry, Treatment facilities.

The problems encountered by the shellfish processing industry in its effort to meet the rising costs of maintaining low pollution standards are discussed. Emphasis is on demonstrating the cash flow basis implications of private construction of waste water treatment facilities for processing firms with regard to their present technological state in waste water treatment, expected effluent standards, residuals recycling, and capital markets. Although various altenatives are available for firms facing compliance with Federal or state effluent standards, it is recommended that consideration be given to initial recommended that consideration be given to initial recommended that consideration be given to initial capital outlay, operation, maintenance and replacement charges, depreciation, tax advantages and methods of financing. It is concluded that the most important of these factors is the expected cash flow of an in-plant treatment system relative to the alternative of municipal treatment expenditures. Each firm must weigh the risks of escalating municipal charges against rising construction, operating maintenance, and replacement costs, and the firm's ability for effective management of the treatment system regarding effluent standards. (Davison-IPA) W79-02516

UPGRADING DIARY PRODUCTION FACILI-TIES TO CONTROL POLLUTION -- IN-PLANT CONTROL OF WASTE,

CONTROL OF WASTE,
Cornell Univ., Ithaca, NY. DePt. of Food Science.
R. R. Zall, and W. K. Jordan.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-258 815,
Price codes: A05 in paper copy, A01 in microfiche.
Presented at the Environmental Protection
Agency Technology Transfer Design Seminar,
Madison, WI, March 1973. 82 p. 21 fig. 9 tab, 73
ref. Langend.

Descriptors: *Dairy industry, *Waste dilution, *Pollution abatement, Detergents, Biological oxygen demand, Equipment, Industrial wastes, Industrial production, Management, Operations, Milk, Milk products, Instrumentation, Agricultural wastes, Monitoring, Water reuse, Waste treatment, Cost analysis, Economic efficiency, Profit, Separation techniques, Monitoring.

The relationship between selected food plant problems and in-plant control of waste and pollution is discussed. In a case study, a New York State dairy plant was subjected to measures emphasizing in-plant actions to minimize waste production, and waste volume was reduced by 50%. Waste reduction involves all in-plant production phases, and personnel education and reeducation. Other measures contributing to waste reduction include partial segregation of the rinsings from lines and equipment, reuse of some detergents and the determination of inefficient areas of plant operation through the use of temperature recorders, conductivity scanners, and weir measuring devices. It is concluded that a new source of revenue can be produced through reduction in waste handling costs and in-plant savings of raw material. (See also W79-02518) W79-02518

UPGRADING DAIRY PRODUCTION TO REDUCE POLLUTION - CHOOSING THE OP-TIMUM FINANCIAL STRATEGY FOR POLLU-TION CONTROL,

Commins (J. A.) and Associates, Inc., Fort Wash-

ington, PA.

U. M. Patankar, and C. R. Marshall.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-258 816,
Price codes: A04 in paper copy, A01 in microfiche.
Presented at the Environmental Protection
Agency Technology Transfer Seminar, Madison,
WI, March 20-21, 1973. 70 p, 10 fig, 6 tab.

Descriptors: *Dairy industry, *Water pollution abatement, *Cost-benefit analysis, Tax rates, Government finance, Legal aspect, Legislation, Federal Water Pollution Control, Financing, Sewage treatment, Industrial waste treatment, Cost analysis, Municipalities, Technology transfer, Water pollution, Agricultural wastes, Investment, Depreciation.

Tax and financing strategies for dairy processing firms to economically finance pollution control equipment are discussed. A method is also presented for financially analyzing whether dairy processors should, when the choice is available, use onsite treatment or send pretreated wastes to a municipal system. It is pointed out that pollution control equipment costs are exempt from certain sales, use and property taxes through tax-exempt financing or adjustment in company income taxes by the addition of special depreciation alternatives. Other incentives include the possibility of government treatment of wastes at lower costs than self-treatment through Federal Government grant programs. To aid companies in making sound management decisions related to pollution control expenditures: standard depreciation for pollution control facilities are discussed; the costs of different methods of financing pollution control equipment are facilities are discussed; the costs of different methods of financing pollution control equipment are examined; financing and tax strategies for equipment are related to company financial strategies; and the availability of the various financing alternatives from the Federal government and from five mid-western states in which the greatest amount of dairy processing takes place are surveyed. (See also W79-02518) (Davison-IPA) W79-02519

INTRODUCTION TO THE MODEL STATE INFORMATION SYSTEM (MSIS).

American Management Systems, Inc., Arlington, VA.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 863, Price codes; A03 in paper copy, A01 in microfiche. Final Report No. EPA-570/9-76-002-4, June 15, 1976. 33 p, 9 fig, 9 tab. 68-01-1968.

Descriptors: *Water quality control, *Model State Information System, *Monitoring, *Computer programs, Safe Drinking Water Act, Data collections, Data transmission, Drinking water, Legislation, Reporting, State jurisdiction, Water quality, Standards, Law enforcement, Water supply, Potable water, Doc. nentation, Regulations.

Water Quality Control-Group 5G

The Model State Information System (MSIS), a computer-based information system, is designed for states which do not have an automated system for managing the water quality data required by the National Interim Primary Drinking Water Regulations. The states will have the option of choosing the basic package consisting of the Public Water Supply Inventory subsystem, Water Quality Compliance subsystem, Regulations subsystem, and Federal Reporting subsystem, plus one or more optional features. The optional features are: variances and exemptions subsystem, enforcement action subsystem, and operator and mailing subsystem. The MSIS will reduce the states' administrative costs in implementing the regulations through computer-based techniques. Costs of software development training and installation will be reduced by the EPA developed system rather than a custom built system. Each of the elements of the water quality complisance subsystem is summarized, key reports are The Model State Information System (MSIS), a Each of the elements of the water quality compliance subsystem is summarized, key reports are tabulated, and a schematic diagram of its function is provided. The MSIS process sequence is discussed from preparation of the operational environment through its entire production including the optional features. A sample operating schedule is provided. (See also W79-02521) (Davison-IPA) W79-02520

BEST MANAGEMENT PRACTICES' FOR SALINITY CONTROL IN GRAND VALLEY, Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. W. R. Walker, G. V. Skogerboe, and R. G. Evans. Publication No. EPA-600/2-78-162 July, 1978. 113 p, 21 fig, 11 tab, 46 ref.

Descriptors: Irrigation, Fluid infiltration, *Salinity control, Seepage, Water distribution, Water loss, Water pollution, *Water quality control, Sprinkler irrigation, *Colorado, *Grand Valley(Colo),

A nontechnical summary of several research activities in the Grand Valley is given. Analyses of alternative measures of reducing the salt load originating from the Valley as a result of irrigation return flows are presented. These alternatives include conveyance channel linings, field relief drainage, on-farm improvements (such as irrigation scheduling, head ditch linings, sprinkler and trickle irrigation), economic control measures such as taxation and land retirement, modified legal constraints, and collection and treatment of return flows with desalting systems. The best management practices for salinity control in the Grand Valley should be primarily the structural rehabilitation and operational modification of the local irrigation system lying below the turnouts from the major canal systems. Canal linings appear in the optimal strategies at higher levels of valley-wide salinity control emphasis but only so far as lining the Government Highline Canal is concerned. Desalting would become a cost-effective alternative salting would become a cost-effective alternative after major irrigation system improvements are implemented. (Skogerboe-Colorado State) W79-02521

SOME IMPACTS OF SAFE DRINKING WATER STANDARDS ON RURAL WATER SYSTEMS, Mississippi State Univ., Mississippi State. Div. of Business Research.

Dustiness Research.
L. R. Cheatham.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-290 370,
Price codes: A06 in paper copy, A01 in microfiche.
Mississippi State University Report 1978, 99 p. 26
tab, 24 ref. OWRT A-111-MISS(1), 14-34-0001-

Descriptors: *Water quality standards, *Water works, *Water costs, *Water treatment, *Treatment facility, *Water law, *Water quality control, *Public utilities, Water demand, Water delivery, Water management, Water pollution sources, Groundwater pollution, Coliform, Disinfection, Filtration, Chlorination, *Potable water, *Missispip, *Small rural water systems, Water associations, Financial position data, *Drinking water regulations, Treatment costs, Monitoring costs,

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Compliance costs, Economies of scale, Customer

Timetable for compliance with National Interim Primary Drinking Water Regulations is such that violation notices sent to systems have thus far been limited to those for bacteria MCLs. In Mississippi this is expected to be the only standard of significant impact. Usage of treatment equipment by systems serving populations of less than 1000 is very limited. Large-percentages of these systems will have to purchase new disinfection equipment to reduce coliform content to the acceptable MCL. Greatest frequency of violations has occurred among the smallest systems. Compliance costs per customer will be greatest among the smaller systems. customer will be greatest among the smaller sys-tems because of high fixed costs of remedies with tems because of high fixed costs of remedies with costs per customer declining as number of customers increase. Projected customer rate increased to compensate for high compliance costs for some small systems are higher than most customers are willing to accept for water quality improvements. Cost increases could result in some systems ceasing operations. In rural areas where customers have an alternative of switching to family wells if system rates become expensive, total revenues may decline because of loss of customers. If small privately because of loss of customers. If small privately owned systems are unable to pass cost increases along to customers, some owners will experience operating losses. W79-02522

ENVIRONMENTAL IMPACT ASSESSMENT. Lyndon B. Johnson School of Public Affairs, stin. TX For primary bibliographic entry see Field 6G. W79-02524

EMERGENCY SUSPENSION PROCEDURES FOR OUTER CONTINENTAL SHELF OIL AND GAS OPERATIONS,

Geological Survey, Washington, DC. Federal Register, Vol. 42, No. 192, p 53956-59, October 4, 1977.

Descriptors: *Continental shelf, *Oil pollution, *Oil spills, *Regulation, Oil industry, Leases, Legal aspects, Water law, Oily water, Water pollu-tion sources, Adoption of practices, Administra-

Promulgated in September, 1977, this federal Department of the Interior rule applies to all Outer Continental Shelf (OCS) oil and gas leases issued after publication. The rule supplements existing OCS oil and gas operations suspension procedures by specifying study methods of threats of signifi-cant irreparable damages, designating the proce-dure for establishing mitigation measures, and redure for establishing mitigation measures, and redefining property rights granted with a lease. If
adequate mitigating measures cannot be designed,
the Secretary of the Interior may, in specified
circumstances, terminate an emergency suspension
and allow a lease term to run without renewal of
operations. Termination of suspension does not
imply approval of operations on the lease. Although lessees will conduct and bear the cost of
necessary studies, the Supervisor's approval of
study plans should protect federal interests. While
the Department of the Interior has no authority to
exercise the power of eminent domain and navexercise the power of eminent domain and pay compensation therefore on the OCS, the Department does not 'take' property rights in the constitutional sense when it exercises rights reserved when a lease was issued. Rights previously granted are not subject to taking without legislation. (Rule-W79-02532

MINERAL MINING AND PROCESSING POINT SOURCE CATEGORY EFFLUENT GUIDELINES AND STANDARDS: PHOS-PHATE ROCK MINING, Federal Register, Vol. 43, No. 48, p 9808-10, March 10, 1978.

Descriptors: *Standards, *Phosphates, *Pollution abatement, *Industrial wastes, Mining, Mineral industry, Navigable waters, Federal water pollution

control act, Regulation, Permits, Fluorides, Effluents.

These source performance standards limit the discharge of pollutants into navigable waters from phosphate rock mining and processing operations that are determined to be new sources. This is in compliance with requirements of the Federal Water Pollution Control Act. The standards are to be incorporated in National Pollutant Discharge Elimination System permits issued to new sources by the federal Environmental Protection Agency (EPA) or by states with EPA approved programs. These regulations apply to any applicable operation, the construction of which is commenced after the publication of proposed new EPA regulations. The effect of these regulations will be to require treatment of waste water discharged from new source phosphate mining and processing operations establish new source performance standards for total suspended solids and pH. The regulations call for the use of best available demonstrated control technology for controlling the discharge of process-generated waste water pollutants. The limitations for the phosphate mining and processing subcategory are applied on a concentration imitations for the phosphate imming and process-ing subcategory are applied on a concentration basis rather than a mass basis. Additional waste water pollutants which are controlled are radiolog-ical parameters, fluoride and phosphates. (Quarlesical para Florida) W79-02534

LEGISLATION AND REGULATION: WHAT'S NEW WITH PL 92-500,

C. W. Heckroth. Water and Wastes Engineering, Vol. 15, No. 1, p 17-32, 1978.

Descriptors: *Legislation, *Water quality act, *Waste water treatment, *Evaluation, Water quality, Chlorination, Technology, Grants, Waste water(Pollution), Toxins, Oil spills, Disinfection.

Congress has finally passed the compromise measure known as the 1977 Clean Water Act and which is now ready for President Carter's signature. This article delves into all aspects of this compromise measure. The new changes contain more flexibility than previous measures. Although everyone is not happy with the compromise, it appears that most people are. The article examines the numerous changes made to the law in detail. The new measchanges made to the law in detail. In enew measures are seen as more practical than the old requirements. Some environmentalists are unhappy because some delays are inherent in the law. However, the basic regulatory framework is intact. The major points of the new amendments are: (1) an extension of the compliance deadline for best pracextension of the compliance deadline for best practical technology standards in certain circumstances; (2) a one-year extension of the compliance deadline for best abailable technology; (3) regulation of some toxic chemicals and other pollutants; (4) allocation of almost \$25 billion for five years of (4) allocation of almost \$25 billion for five years of cleanup; and (5) authority to grant treatment facility grants. The article also discusses specially selected areas of the Act which have constantly revitalized ongoing programs. These include disinfection techniques, hazardous wastes and areawide water quality planning programs. (Quarles-Florida) W79-02537

THE CLEAN WATER ACT OF 1977, R M Hall Ir.

Natural Resources Lawyer, Vol. 11, No. 2, p 343-72 1978

Descriptors: *Federal water pollution control act, *Legislation, *Planning, *Analysis, Construction, Grants, Technology, Toxins, Standards, Pollutants,

The 1977 Clean Water Act amends a number of significant aspects of the 1972 Federal Water Pollution Control Act Amendments. This article reviews and analyzes the major features of these new amendments. The 1977 amendments reflect extensional control of the cont sive fine tuning of a complex statute. During the five years since the 1972 amendments were passed, the Environmental Protection Agency and the courts have been grappling with implementation problems. These arise from both practical difficulties and statuory ambiguity. The 1977 amendments ease many of these problems. The new amendments also impose additional responsibilities on various government agencies which have the duty of implementation. The legislation also imposes new requirements on industries and others who must comply with the Act. Additional burdens are placed upon the nation's taxpayers who must bear the ultimate financial burden of cleaning up the nation's waters. The author suggests that the new amendments will raise new problems of statutory interpretation. The article includes background on the 1972 amendments' effect, as well as the legislative history of the 1977 amendments. (Quarles-Florida) W79-02538

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TIDELANDS AND THE PUBLIC TRUST: AN APPLICATION FOR SOUTH CAROLINA, For primary bibliographic entry see Field 6E. W79-02539

THE WATER QUALITY IMPROVEMENT ACT OF 1970, THE 1972 AMENDMENTS AND STATE ANTIPOLLUTION LAWS,

D. R. Villareal, Jr.
The Forum, Vol. 13, No. 2, p 438-51, Winter 1978.

Descriptors: "Water quality act, "Oil spills, "Remedies, "Penalties(Legal), Legislation, Legal aspects, Water law, State jurisdiction, Federal jurisdiction, Statutes, Regulation, Water pollution.

Under the 1970 Water Quality Improvement Act and the Act's 1972 amendments, the person in charge of an offshore or onshore facility or a vessel, has a duty of reporting any discharge of oil in harmful quantities into or upon the navigable waters of the United States, adjoining shore lines, or waters of the contiguous zone. The U.S. Coast Guard has been designated as the appropriate agency to report to. However, there may also be a duty to report to a state authority. While the President is authorized to remove spilled oilunless he determines that it will be done properly by those responsible for it—there is no mandate in the Act that the spilled oil be cleaned up. If the President orders the oil removed, removal costs are recoverable from the spiller. There are criminal sanctions for violations of the Acts, in addition to sanctions still in effect under the 1899 Refuse Act. Civil penalties and damage liability may also be assessed. Because Puetro Rico and the 22 coastal states have also enacted reporting, cleanup and damages statutes, there is some overlap of federal and state legislation. (Rule-Florida) W79-02542 W79-02542

BANNING DETERGENT PHOSPHATES - THE DEBATE CONTINUES,

Journal of the Water Pollution Control Federation, Vol 50, No 2 p 190-92, 1978.

Descriptors: *Great Lakes region, *Eutrophica-tion, *Phosphates, *Detergent, Great Lakes, Phos-phorus, Nutrients, Nutrient removal, Municipal wastes, Canada, Waste water treatment, Water

The release of a paper prepared by the federal Environmental Protection Agency (EPA) Region V Phosphate Committee titled 'Detergent Phosphates Ban' has re-ignited the old controversy over banning detergent phosphates. The paper recognizes that phosphorus is the primary nutrient responsible for lake eutrophication and advocates that states in the Great Lakes Basin adopt a ban on phosphorus in detergents. Phosphorus has been identified as the cause of advanced eutrophication in the Great Lakes. The detergent industry has reacted strongly in opposition to such a ban, contending such a restriction alone will not relieve the Great Lakes region of its eutrophication problems. Past EPA policy is explained, including the United States-Canada agreement limiting phosphorus discharges by municipal treatment plants. The deter-

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gent industry argues that the technology to remove phosphorus from wastewater is available, and a ban is not justifiable. The search for alternatives to phosphate detergents is explained, as well as the economic impact of a phosphate ban. The latest legislative maneuvering on the issue is revealed, and the conclusion reached that no major advances are in sight. (Quarles-Florida)

CONSUMER NOTIFICATION - PUBLIC AWARENESS OR THE SMOKING PISTOL, California State Dept. of Health, Berkeley.

Journal of the American Water Works Association, Vol. 69, No. 11, p 574-76, 1977.

Descriptors: *Public utilities, *Administrative decisions, *Water quality control, *Potable water, Water supply, Water quality standards, Water quality, California, Public health, Administration, Regulation, Legislation.

Regulation, Legislation.

The expressed purpose of the federal Safe Drinking Water Act is to assure that water-supply systems serving the public meet minimum national standards for protection of public health. The mandatory public notification provision contained in the Act has caused much consternation in the water-supply industry for utility members and regulatory agencies. No one is sure what to expect from consumers, state regulatory agencies or the federal Environmental Protection Agency (EPA). The article examines the activities of the California State Department of Health as they relate to the consumer notification requirements that presently exist. In this way, some of the problems and opportunities that lie in the future may be revealed. The two specific instances where the Department might require a utility to notify the public are: (1) when there is a water quality emergency resulting in a total system contamination; and (2) when the Department decides that public interest requires notification. The latter instance is the most controversial and may occur for various reasons. The author concludes that the EPA wishes to provide national policy and guidance and that utilities are expected to be responsible for providing clean water. (Quarles-Florida)

OVERVIEW OF FEDERAL GROUNDWATER PROTECTION LEGISLATION AIDS ENVIRONMENTALISTS,

Environmental Protection Agency, Washington, DC. Criteria and Standards Div. R. K. Ballentine.

Water and Sewage Works, Vol. 125, No. 4, p 68-

Descriptors: *Groundwater, *Groundwater resources, *Legislation, *Federal water pollution control act, Federal government, Water management(Applied), Conservation, Water quality, Toxins, Administrative agencies, Evaluation, Water policy.

Federal statutes dealing with groundwater quality protection, even ones having peripheral impact, are discussed here in detail. The Safe Drinking Water Act, perhaps the law with the greatest impact in this area, is omitted from discussion. The statutes discussed are: (1) the 1972 Federal Water Pollution Control Act Amendments (FWPCA); (2) the Toxic Substances Control Act; (3) the 1976 Resource Conservation and Recovery Act; (4) the 1969 National Environmental Policy Act; and (5) two executive orders on the subject. Control of 1969 National Environmental Policy Act; and (5) two executive orders on the subject. Control of groundwater quality protection on federal lands and federal facilities is also discussed. The FWPCA requires waste-treatment management plans to include processes necessary to control groundwater quality. States are required to enforce any groundwater provision of any Section 208 agency. The federal Environmental Protection Agency (EPA) is required to issue guidelines for methods to control pollution resulting from the disposal of pollutants in subsurface excavation. The EPA may delegate to the states the power to issue permits controlling the disposal of pollutants into

wells. The impact on groundwater protection by the other legislative acts is also discussed in detail. (Quarles-Florida) W79-02346

NONDETERIORATION AND THE PROTEC-TION OF HIGH QUALITY WATERS UNDER FEDERAL WATER POLLUTION CONTROL LAW,

Utah Law Review, Vol. 1977, No. 4, p 737-57.

Descriptors: *Federal water pollution control act, *Degradation(Stream), *Water quality control, *Analysis, Water quality, Water quality standards, Legislation, Federal government, Regulation, Judicial decisions, Economics, Evaluation.

The policy of prevention of significant deteriora-tion of high quality water, which arose from the 1972 Federal Water Pollution Control Act Amendtion of high quality water, which arose from the 1972 Federal Water Pollution Control Act Amendments, has received scant attention. This may be a sign that the Federal Environmental Protection Agency (EPA) has satisfied all rival camps, or perhaps it indicates that the policy's potential has not been fully realized. This article explores the nondegradation policy of the Act and the legal foundation for its implementing regulations. The language used by the EPA in its implementing regulations is examined along with the adequacy of the protection afforded high quality waters by the regulations. The author concludes with suggested methods to protect high quality waters. The regulations preventing degradation are ambiguous and nonspecific, tending to result in weak enforcement. Furthermore, the EPA has vested much discretion in the states resulting in national irregularity. The author suggests quality waters. Adoption of the following is urged: (1) more clearly defined procedures for public participation; (2) intergovernmental input; (3) federal intervention; and (4) EPA review of policy decisions. (Quarles-Florida) W79-02547

NIAGRA OF WISCONSIN PAPER CORP. V. WISCONSIN DEPT. OF NATURAL RESOURCES (STATE EFFLUENT DISCHARGE PERMITS MUST BE MODIFIED IN ACCORDANCE WITH STATE LAW TO COMPLY WITH EPA STANDARDS.

For primary bibliographic entry see Field 6E. W79-02560

CONCERNED CITIZENS FOR ORDERLY PROGRESS V. COMMONWEALTH OF PENN-SYLVANIA, DEPT. OF ENVIRONMENTAL RE-SOURCES (SEWAGE FACILITY CONSTRUC-TION PERMIT UPHELD).

For primary bibliographic entry see Field 6E. W79-02569

WESTERN WATER LAWS AND IRRIGATION RETURN FLOW,
Resources Administration and Development, Inc.,

Fort Collins, CO.

G. E. Radosevich.

Publication No. EPA-600/2-78-180, August, 1978.

257 p, 5 fig, 3 tab, 107 ref, 1 append.

Descriptors: *Water law, *Water rights, Irrigation, Irrigated land, Water pollution, Water quality, *Return flow, Prior appropriation.

The impact of water law upon allocation and use of waters within the Western United States is currently recognized as one of the major constraints to adaptation by irrigated agriculture of more efficient operation practices. This project provides a background of the law and evaluation of the potentials through water law interpretations or changes to implementing improved water management technology. Specifically, this report provides a synthesis of water laws of each of the 17 western states, as well as providing a state-by-state account of the water quantity laws, paying particular attention to features in the laws and their administration that direct the manner of use and provide incentives or disincentives to more effi-

cient use. General recommendations are offered that will permit or induce more efficient and effective water management. Specific recommendations identify areas requiring additional research to renovate state water laws consistent with present and prospective policies and needs. (Skogerboe-Colorado State) W79_02575

SELECTED IRRIGATION RETURN FLOW OUALITY ABSTRACTS 1976, SIXTH ANNUAL

ISSUE, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering. For primary bibliographic entry see Field 10C. W79-02580

THE USE OF POTASSIUM PERMANGANATE (KMNO4) IN FISHERIES; A LITERATURE REVIEW,

Fish and Wildlife Service, Fayetteville, AR. South Central Reservoir Investigations. T. O. Duncan.

1. O. Duncan.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-275 397, Price codes: A04 in paper copy, A01 in microfiche. Fish and Wildlife Service, Division of Fishery Research, Report No. FWS-LR-74-14 (Revised), 54 p, 1978. 4 tab, 129 ref.

Descriptors: *Potassium compounds, *Salts, *Manganese, *Fish hatcheries, Disinfection, Fish management, Fish parasites, Fish physiology, Fish diseases, Fungicides, Algicides, Piscicides, Rotenone, Antimycin A, Dissolved oxygen, Oxygen sag, Chemical analysis, Chemical properties, Aquiculture, Toxicity, *Bibliographies, *Potassium permanganate, *Permanganates.

Potassium permanganate is one of the most widely used inorganic chemicals in the world. Since its first use in fish culture in 1893, potassium permanganate has been used primarily as: (1) a disinfectant in fish hatcheries for aquatic plants, aquaria, raceways, ponds, and water supplies; (2) for removal of fish parasites; (3) to reduce disease, or as a disease preventative, especially on wounds of fish; (4) for detoxification of fish toxicants such as rotenone, and antimycin: (5) for fungus and algae insi; (4) for decoxification of this foxicants such as rotenone, and antimycin; (5) for fungus and algae control; and (6) temporary oxygen depletion problems in ponds. In foreign countries, potassium permanganate is used for removal of parasites before the live fish is sent to market, as well as a disinfectant. (EIS-Deal) W79-02585

A BIOMONITORING PROCEDURE UTILIZ-ING NEGATIVE PHOTOAXIS OF INSTAR AEDES AEGYPTI LARVAE,

Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Entomology.
For primary bibliographic entry see Field 5A.
W79-02593

EVALUATION OF IRRIGATION METHODS FOR SALINITY CONTROL IN GRAND

VALLEY, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering. R. G. Evans, W. R. Walker, G. V. Skogerboe, and

Publication No. EPA-600/2-78-161, July, 1978. 172 p, 50 fig, 8 tab, 150 ref.

Descriptors: Irrigation, *Salinity control, Saline soils, *Water quality control, Water pollution, Water loss, *Colorado, *Grand Valley(Colo),

Irrigation return flows in the Upper Colorado River Basin carry large salt loads as a result of contact with the saline soils and the marine derived geologic substratum. The Grand Valley of West-ern Colorado is a major contributor to the salinity problems of the basin and is, therefore, a logical region to test the effectiveness of agricultural salinity control alternatives. This study emphasized the implementation of on-farm salinity control alterna-

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tives; primarily evaluating irrigation scheduling, furrow irrigation, sprinkler irrigation, and trickle irrigation. Border irrigation was also evaluated, but was not implemented as part of this study. The cost-effectiveness of the various on-farm alternatives in the Grand Valley is summarized and presented in this report. (Skogerboe-Colorado State) W79-02594

AVIAN COMMUNITIES AND HABITAT COM-PONENTS IN NATURAL AND WASTEWATER-IRRIGATED ENVIRONMENTS,

Pennsylvania State Univ., University Park

S. J. Lewis.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 393, Price codes: A07 in paper copy, A01 in microfiche. MS Thesis, November, 1977. 143 p, 8 fig, 21 tab, 173 ref, append. OWRT B-084-PA(3), 14-34-0001-6113

Descriptors: *Birds, *Waste water(Irrigation), *Pennsylvania, Habitats, Seasonal, *Avian population, *Spray irrigated, *Municipal sewage effluent, Arthropod, *Foliage height diversity, *Effluent spraying, Vegetative succession, Environmental conditions, Herbaceous vegetation, Red-winged Blackbird, Habitat changes,

Avian populations, guilds, and communities were monitored in old field (OF), aspen-pine-shrub (APS), and mixed oak (MO) habitats in Pennsylvania. Portions of the Study area had previously been spray-irrigated with municipal sewage effluent. The objectives of this study were to determine relationships between birds and selected habitat components (vegetative structure and arthropod abundance) and to evaluate how these changed with year, season, vegetative succession, and habi-tat treatment (wastewater irrigation). Within the successional gradient of the OF, APS, and MO areas, the following patterns were noted. As sucaces, the tolowing patterns were included as accession advanced, upper vegetative strata became more prominent and shading caused low vegetation to decline. Associated with the progressive loss of herbaceous vegetation was a decrease in the loss of heroacceus vegetation was a accrease in the abundance of arthropods. Total vegetative cover increased with succession. Total breeding bird abundance declined with succession. Bird species diversity (BSD) increased with foliage height diversity. The abundances of bird species using specific accretion to the species of the species of the species of the species of the species using specific accretion to the species of the species using specific accretion to the species of the species using specific accretion to the species of the speci cific vegetative strata for nesting and foraging were directly related to the quantity of foliage available in those strata. Although wastewater irrigation of APS and MO vegetation had ceased one and two years before this study, numerous habitat changes caused by the process were still evident. Avian community abundance, dominance, and evenness changed significantly with effluent spray-ing. (Sink-Penn State)

NEPA'S EFFECT ON THE CONSIDERATION OF ALTERNATIVES: A CRUCIAL TEST, Stanford Univ., CA. Dept. of Civil Engineering.

W. W. Hill, and L. Ortolano.

Natural Resources Journal, Vol. 18, No. 2, p 285-311, April 1978. OWRT-C-4080(No 9017)(3), 14-31-0001-9017.

Descriptors: *Water resources planning, *Alternatives, Evaluation, *Water law, *Nonstructural alternatives, Soil Conservation Service, Army Corps of Engineers, National Environmental Policy Act, Council on Environmental quality, Environmental specialists, Interdisciplinary planning.

An examination was made of the National Envi-ronmental Policy Act's (NEPA) effects and effec-tiveness in two federal water resources planning programs: the small watershed program of the U.S. Department of Agriculture's Soil Conservation Department of Agriculture's Soil Conservation Service (SCS) and the survey investigation program (preauthorization studies) of the U.S. Army Corps of Engineers (Corps). Results from that portion of the research dealing with NEPA's influence on the formulation and evaluation of alternatives are presented. These results are based on data obtained from questionnaire surveys mailed in 1974 to all Corps District officers and SCS State offi-

cers. The data collected are used to conclude that the Corps and SCS planning studies underway in early 1974, NEPA had not greatly affected either the types of alternatives being considered or who and what influenced the formulation and evaluation of these alternatives. W79-02607

TROPHIC INTERACTIONS.

Environmental Research Lab., Fairbanks, AK. Arctic Project Office.
For primary bibliographic entry see Field 5C. W79-02610

ECOLOGICAL EFFECTS OF AN ARTIFICIAL ISLAND, RINCON ISLAND PUNTA GORDA, CALIFORNIA,

Dames and Moore, Los Angeles, CA. For primary bibliographic entry see Field 6G. W79-02614

A BIOLOGIST LOOKS AT OIL IN THE SEA, Dalhouse Univ., Halifax (Nova Scotia). Dept. of

Shore & Beach, Vol. 46, No. 4, p 27-29, October 1978.

Descriptors: *Oil spills, *Oil pollution, *Environ-mental effects, *Arctic, Water pollution effects, Baseline studies, Shores, Coasts, *Outer Continen-tal Shelf, Petroleum development.

Nature is extremely variable and we have to survey the whole range of this natural variability before making comparison with a polluted situation. It is now known how much harm is done by an oil slick in the open sea, but when it comes ashore there is trouble in plenty. When oil comes ashore this highly productive area is damaged in differing degrees according to the type of oil and the type of community that lives there. The biological decomposition of oil and the recolonization the type of community that lives there. The bio-logical decomposition of oil and the recolonization process are both functions of the metabolism of marine organisms, and this is slower in colder waters. Hence, it is safe to say that the recovery period for oiled arctic shorelines would be well in period for oiled arctic snorelines would be well in excess of ten years. It has been shown repeatedly, that the number of species of plant and animal present, i.e. the species diversity, in an area after an oil spill is lower than that found in uncontaminated areas. For our knowledge of biological variability it is highly probable that information obtained should be a species occurring in the species occurring the species occurrence about a species occurring in temperate waters is not applicable to the same, or a related species that may be living in the arctic environment. Food chains in Arctic waters are made up of rather few species, so that elimination of a key species could cause a major disruption in the productivity of species that serve as food for native peoples, and the dangers appear even more ominous. Consider-ing the Arctic in particular, it does seem that the dangers of very serious impairment of the function-ing of natural marine systems there are very real indeed. (Sinha-OEIS) W79-02615

VULNERABILITY OF COASTAL ENVIRON-MENTS TO OIL SPILL IMPACTS,

South Carolina Univ., Columbia. E. R. Gundlach, and M. O. Hayes.

Marine Technology Society Journal, Vol. 12, No. 4, p 18-27, August-September 1978. 1 fig. 3 tab, 55 ref. NSF-ENV76-068-98-A02.

Descriptors: *Oil spills, *Coasts, *Water pollution effects, Resources development, Environmental effects, *Outer Continental Shelf, Vulnerability

Contingency planning for potential oil spills is becoming a necessity for most of the coastal water-ways of the United States. An important part of a ways of the Order States. An important part of washe contingency plan is the protection of those coastal environments most likely to be seriously damaged by oil contamination in the event of a spill. On the basis of field studies of five major oil spills and a review of the literature, major coastal

environments have been classified on a scale of 1 to 10 in terms of potential vulnerability to oil spill damage. The scale emphasizes oil residence time, with consideration of initial biological impacts. Exposed rocky headlands and wave-cut platforms (1 and 2 on the Vulnerability Index) are generally lest affected by an oil spill. Coarse-grained sandy and gravel beaches, which are subject to oil penetration and burial, are assigned intermediate index values of 4 to 7. Sheltered environments such as sheltered rocky coasts, salt marshes, and mangroves (index values of 8 to 10) are the environments most likely to be adversely affected by oil spills. For example, residence times of over 10 years are predicted for some salt marsh areas. (Sinha-OEIS) W79-02616

IMPLEMENTATION OF AGRICULTURAL SA-LINITY CONTROL TECHNOLOGY IN GRAND VALLEY,

Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. cultural and Chemical Engineering. R. G. Evans, W. R. Walker, G. V. Skogerboe, and

C. W. Binder. Publication No. EPA-600/2-78-160, July, 1978. 193 p, 62 fig, 29 tab, 46 ref.

Descriptors: Irrigation, Ditches, Irrigation canals, *Salinity control, Saline soils, Salt water, Seepage, Water distribution, *Water quality control, Agricultural runoff, *Return flow.

A summary of the results of applied research on salinity control of irrigation return flows in the Grand Valley of Colorado is presented for the period of 1969 to 1976. Salinity and economic impacts are described for the Grand Valley Salinity Control Demonstration Project which contain approximately 1,600 hectares and involves most of the local irrigation companies in the Valley. During the eight years of the demonstration project, 12.2 km of canals were lined, 26.54 km of laterals were lined, 16,400 meters of drainage tile were installed, a wide variety of on-farm improvelaterals were lined, 16,400 meters of drainage tile were installed, a wide variety of on-farm improvements were constructed, and an irrigation scheduling program was implemented. On-farm improvements evaluated were solid-set sprinklers, side-roll sprinklers, drip (trickle) irrigation, furrow irrigation. The total value of the constructed improvements in the demonstration area was about \$750,000. The total value of the constructed improvements in the demonstration area was about \$750,000. The total value of the constructed in a sale reduction of 12 300. improvements resulted in a salt reduction of 12,300 metric tons per year reaching the Colorado River. This salt reduction results in an annual benefit to downstream water users of nearly \$2,000,000. In addition, there are benefits to the local water users with increased crop yields, and to the people of Grand Valley in increased business. (Skogerboe-Colorado State) W79-02617

ALTERNATIVE POLICIES FOR CONTROL-LING NONPOINT AGRICULTURAL SOURCES OF WATER POLLUTION,

Illinois Univ. at Urbana-Champaign. W. D. Seitz, D. M. Gardner, S. K. Gove, K. L. Guntermann, and J. R. Karr.

Ountermann, and J. R. Karr. Available from the National Technical Information Service, Springfield, VA 22161 as PB-280 757, Price codes: A14 in paper copy, A01 in microfiche. Publication No EPA-600/5-78-005, April, 1978. 314 p, 22 fig, 55 tab, 168 ref, 8 append.

Descriptors: Water pollution sources, Soil erosion, Economics, *Alternative planning, Nonpoint pollution sources, Water pollution control, Agricultural runoff, *Return flow.

This study of policies for controlling water pollu-tion from nonpoint agricultural sources includes a survey of existing state and Federal programs, agencies, and laws directed to the control of soil erosion. Six policies representing a variety of approaches to this pollution problem are analyzed. The aggregate economic impact of such policies is investigated using a state-of-the-art, market-equilibrium, linear-programming model of crop production in the corn belt. The economic effects of the policies at the level of individual forms and their

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PRORI TENTIA impacts on long-term soil productivity are analyzed through the use of a watershed model. The institutional arrangements needed to implement the policies are examined, as are the associated costs for a typical county. Literature on the social aspects of policy acceptance is reviewed, and the results of a survey of the reaction of farmers and ASCS directors in Illinois to different policies are presented. The equity of the policies is examined and legal precedents are reviewed. (Skogerboe-Colorado State)

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INTEGRATING DESALINATION AND AGRICULTURAL SALINITY CONTROL ALTERNA-

TIVES, Colorado State Univ., Fort Collins. Dept. of Agri-cultural and Chemical Engineering.

W. R. Walker.
Publication No. EPA-600/2-78-074, April, 1978.
182 p, 30 fig, 17 tab, 55 ref, 2 append.

Descriptors: Cost effectiveness, *Desalination, Optimization, *Salinity control, Sprinkler irrigation, Water quality control, Alternative costs, *Return

The cost-effectiveness relationships for various agricultural and desalination alternatives for controlling salinity in irrigation return flows are developed. Selection of optimal salinity management strategies on a river basin scale is described as a problem of integrating optimal strategies with individual subbasins and irrigated valleys. Desalination systems include seven processes: (1) multistage distillation; (2) vertical tube evaporation in conjunction with (1); (3) a vapor compression form of (2); (4) electrodialysis; (5) reverse osmosis; (6) vacuum freezing - vapor conveyance linings, irrigation scheduling, automation, sprinkler irrigation systems, and trickle irrigation systems. A case study of the Grand Valley in western Colorado is presented to demonstrate the analysis developed. Results indicate that treatments of the agricultural system are generally more cost-effective than desalting except for high levels of potential salinity control. Lateral linings and on-farm improvements are the best agricultural alternatives. (Skogerboe-Colorado State)

ASSESSING THE SPATIAL VARIABILITY OF IRRIGATION WATER APPLICATIONS, Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. For primary bibliographic entry see Field 3F. W79-02632

SUBSTITUTE CHEMICAL PROGRAM - INI-TIAL SCIENTIFIC AND MINIECONOMIC REVIEW OF METHYL PARATHION, Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.

For primary bibliographic entry see Field 5C.

W79-02633

PREIMPOUNDMENT STUDY LITTLE BLACK CREEK DRAINAGE BASN BLACK CREEK WA-TERSHED BULLOCH COUNTY, GEORGIA, Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div. For primary bibliographic entry see Field 5C. W79-02635

EFFECTS OF CHANNELIZATION OF THE LUXAPALILA RIVER ON FISH, AQUATIC IN-VERTEBRATES, WATER QUALITY AND FUR-

Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.
For primary bibliographic entry see Field 5C.
W79-02636

PROBLEM DEFINITION STUDIES ON PO-TENTIAL ENVIRONMENTAL POLLUTANTS, IV: PHYSICAL, CHEMICAL, TOXICOLOGI-

CAL, AND BIOLOGICAL PROPERTIES OF BENZENE; TOLUENE; XYLENES; AND P-CHLOROPHENYL METHYL SULFIDE, SUL-FOXIDE, AND SULFONE.

FOXIDE, AND SULFONE.

Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A040 435, Price codes: A05 in paper copy, A01 in microfiche. Army Medical Research and Development Command, Wash. D.C., Technical Report 7605, June 1976. 98 p, 14 tab, 1 fig, 217 ref. Edited T. A. Miller

Descriptors: Analytical methods, *Birds, *Fish, *Invertebrates, *Mammals, Organic compounds, Microbiology, *Toxicity, Mortality, *Wildlife, Physical properties, Chemical properties, Biological properties, Reviews, Oil, Oil pollution, *Benzene, *Toluene, *Xylene, P-chlorophenyl methyl sulfide, P-chlorophenyl, Methyl sulfoxide, Caraticocenetics

A data base was established of physical, chemical, toxicological, and biological properties for: benzene, toluene, xylenes, and p-chlorophenyl methyl sulfide, p-chlorophenyl methyl sulfoxide, and provides a summary of pertinent information concerning: physical/chemical properties; analytical methods; mamalian toxicology; environmental considerations for wildlife, birds, fish, reptiles, amphibians, invertebrates, Microorganisms, and plants; and existing standards. (EIS-Katz)

SELECTED HYDROLOGIC DATA, 1931-77, WASATCH PLATEAU-BOOK CLIFFS COAL-FIELDS AREA, UTAH, Resources Div. For primary bibliographic entry see Field 7C. W79-02645 Geological Survey, Salt Lake City, UT. Water

IMPACT OF FLOW REGULATION AND POWER PLANT EFFLUENTS ON THE FLOW AND TEMPERATURE REGIMES OF THE CHATTAHOCHEE RIVER - ATLANTA TO WHITESBURG, GEORGIA, Geological Survey, Doraville, GA. Water Re-

sources Div.
For primary bibliographic entry see Field 5B.
W79-02648

DISSOLVED-OXYGEN REGIMEN OF THE WILLAMETTE RIVER, OREGON, UNDER CONDITIONS OF BASINWIDE SECONDARY TREATMENT,

Geological Survey, Portland, OR. Water Resources Div.

W. G. Hines, S. W. McKenzie, D. A. Rickert, and F. A. Rinella.

Available from Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202. Circular 715-I, 1977. 152 p, 30 fig. 10 tab, 32 ref.

Descriptors: *Water pollution control, *Pollution abatement, *Dissolved oxygen, *Monitoring, *Low-flow augmentation, Biochemical oxygen demand, Water treatment, Oregon, *Willamette River(Ore), Tertiary treatment.

For nearly half a century the Willamette River in Oregon experienced severe dissolved-oxygen problems related to large loads of organically rich waste waters from industries and municipalities. Since the mid-1950's dissolved oxygen quality has gradually improved owing to low-flow augmentation, the achievement of basinwide secondary treatment, and the use of other waste-management practices. As a result, summer dissolved-oxygen levels have increased, salmon runs have returned, and the overall effort is widely regarded as a singular water-quality success. To document the improved dissolved-oxygen regimen, the U.S. Geological Survey conducted intensive studies of the Willamette during the summer low-flow seathe Willamette during the summer low-flow sea-sons of 1973 and 1974. During each summer the mean daily dissolved-oxygen levels were found to

Water Quality Control—Group 5G

be higher than 5 milligrams per liter throughout the river. Because of the basinwide secondary the river. Because of the basinwide secondary treatment, carbonaceous deoxygenation rates were low. In addition, almost half of the biochemical oxygen demand entering the Willamette was from diffuse (nonpoint) sources rather than outfalls. These results indicated that point-source biochemical oxygen demand was no longer the primary cause of dissolved-oxygen depletion. Instead, the major causes of deoxygenation were nitrification in a shallow 'surface active' reach below Salem and an anomalous oxygen demand (believed to be pri-marily of benthal origin) in Portland Harbor. (Woodard-USGS)

WATER QUALITY IN THE SUGAR CREEK BASIN, BLOOMINGTON AND NORMAL, ILLINOIS.

Geological Survey, Champaign, IL. Water Resources Div. For primary bibliographic entry see Field 5B. W79-02660

AN OILSPILL RISK ANALYSIS FOR THE MID-ATLANTIC (PROPOSED SALE 49) OUTER CONTINENTAL SHELF LEASE AREA, Geological Survey, Reston, VA. Water Resource

J. R. Slack, and T. Wyant. Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 401, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 78-56, 1978. 72 p, 9 fig, 5 tab, 17 ref, append.

Descriptors: *Oil spills, *Hazards, *Probability, *Continental shelf, *Atlantic Ocean, Mathematical studies, Computer models, Stochastic processes, Simulation analysis, Monte Carlo method, Path of pollutants, Planning, *Outer Continental Shelf

An oilspill risk analysis was conducted to determine the relative environmental hazards of developing oil in different regions of the mid-Atlantic Outer Continental Shelf lease area. The study analyzed the probability of spill occurrence, likely paths of the spilled oil, and locations in space and time of recreational and biological resources that time of recreational and biological resources that are likely to be vulnerable. These results are com-bined to yield estimates of the overall oilspill risk bined to yield estimates of the overall oilspill risk associated with development of the proposed lease area. The analysis implicitly includes estimates of weathering rates and slick dispersion and an indication of the possible mitigating effects of cleanups. Assuming that economically recoverable amounts of petroleum are found in the area, the leasing of the tracts proposed for sale 49 will increase the expected number of spills by about 20-25 percent over the number expected from the existing (sale 40) leases. The probability that an object such as land will be contacted by a spill is increased by at most five percentage points. (Woodard-USGS) W79-02661 W79-02661

EVALUATION OF LINER MATERIALS EX-POSED TO LEACHATE, Matrecon, Inc., Oakland, CA. For primary bibliographic entry see Field 8G. W79-02704

ASSESSMENT AND IMPLEMENTATION OF IN-STREAM VALUE STUDIES FOR THE NORTHERN GREAT PLAINS, Montana Univ., Missoula. Dept. of Geology. For primary bibliographic entry see Field 4A. W79-02709

LAS VEGAS VALLEY WATER BUDGET: RE-LATIONSHIP OF DISTRIBUTION, CON-SUMPTIVE USE, AND RECHARGE TO SHAL-LOW GROUNDWATER,

Nevada Univ. System, Las Vegas. Desert Research Inst. R. O. Patt.

Publication No. EPA-600/2-78-159, July, 1978. 61

Group 5G-Water Quality Control

p. 16 fig. 8 tab. 19 ref. 3 append.

Descriptors: Groundwater, *Groundwater recharge, *Water consumption, *Return flow, *Consumptive use, Artificial recharge, *Nevada, *Distribution, *Las Vegas Valley(NV).

Estimates of quantity and geographic distribution of recharge to the shallow groundwater zone from water use return flows in Las Vegas Valley were made for the years 1973, 1965, 1968, 1960, and 1943 as part of a broader study on the impact of water and land use on groundwater quality. Considered components of water use in Las Vegas Valley include the following: supply from surface and groundwater; agriculture using potable water; agriculture using potable water; agriculture using potable water; agriculture using potable water; agriculture using sewage effluent watering; lawn watering of parks, schools, cemetaries, hotels, motels; golf courses using potable water; septic tank recharge; evaporative coolers; system losses' industrial use; power plant cooling; swimming pool use; consumptive use by phreatophytes; in-valley recharge from precipitation, and 'unaccounted for water.' Consumptive use of plants was calculated through use of the Blaney-Criddle method as 3.47 feet per year and recharge was assumed to be the difference between applied water and calculated consumptive use as determined by this method could be low by 1.5 to 2 feet per year, and thus the following estimates of recharge to the groundwater system are considered maximum, in acre feet: 1973-39,000; 1952-16,000; 1950-13,000; and 1943-21,000. (Skogerboe-Colorado State)

NEW CONSIDERATIONS FOR MUNICIPAL WATER SYSTEM PLANNING,

Montgomery (James M.)
For primary bibliographic entry see Field 6B.
W79.02729

TECHNICAL GUIDELINES FOR PUBLIC WATER SYSTEMS.

Clean Water Consultants, El Dorado Hills, CA. Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 217, Price codes: A20 in paper copy, A01 on microfiche. Final Report, June 16, 1976. 477 p, 776 ref, 3 append. 68-01-2971.

Descriptors: *Water supply, *Water quality control, *Water treatment, *Water management, Water quality act, Personnel, Design criteria, Water quality standards, Chlorination, Fluoridation, Distribution systems, Planning, Water analysis, Water chemistry, Manuals, Engineering, Systems analysis, Maintenance, Operations, Pumping plants, Water storage.

Technical guidelines for the design, operation, maintenance, staffing and surveillance of public water systems are presented. The manual was prepared to give information on Federal requirements and regulations and as a further guide to professional engineers responsible for the design and construction of public water supplies. Ten sections are developed, each of which has a summary of standards, a discussion of design parameters, and a rationale for standards. The topics covered include: general design considerations, source development, treatment, chemical application, pumping facilities, storage, distribution systems, operation and maintenance, surveillance, and personnel. An extensive bibliography is provided, and three appendices containing a glossary of terms, typical job descriptions, and addresses for obtaining standard documents and references is included. (Davison-IPA)

PROGRAM IMPLEMENTATION PROCE-DURES: IMPLEMENTATION OF TWO YEAR POST HIGH SCHOOL WASTEWATER TECH-NOLOGY INSTRUCTIONAL PROGRAMS. Clemson Univ., SC. Dept. of Environmental Systems Engineering. Available from the National Technical Information Service, Springfield, VA 22161 as PB-238 595, Price codes: A03 in paper copy, A01 in microfiche. 1973. 47 p. 2 fig. 2 tab, 1 append. T-900168.

Descriptors: *Education, *Training, *Waste water treatment technology, *Personnel, Programs, Training procedure, Training institutions, Training requirements, Employment opportunities, Occupations, Waste treatment, Waste water treatment, Plant operations, Education, Schools(Education), Technology transfer.

A revised edition of the 1970 publication, 'Criteria for Establishment of Two Year Post High School Wastewater Technology Programs,' is presented. Experience with this project, originally designed as a federally funded concept, showed that the program could be adapted for any two year post high school institution wanting to provide a program for waste water technicians. The major attributes of such an institution are summarized, and suggestions for administering this program are given. A suggested two year program, including course descriptions prepared in performance terms, is provided. (Davison-IPA)

EVALUATION OF PROPOSED NPDES LIMITATIONS FOR HOMESTAKE MINING COMPANY AND LEAD-DEADWOOD SANITARY DISTRICT NO. 1.

National Inforcement Investigations Center, Denver, CO.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 596, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-330/2-75-002, February 1975. 25 p, 1 fig, 6 tab, 10 ref, 1 append.

Descriptors: *Mine wastes, *Sewage districts, *Bioassays, *Cyanide, *Fishkill, Cold water fish, Fisheries, Water pollution, Water pollution effects, Effluents, Waste water treatment, Water quality control, Water pollution control, Water pollution sources, Whitewood Creek, Spearfish Creek, Lead, South Dakota, Toxicity, Chlorides, Chlorine, Simulation analysis.

Results are presented of an investigation: to determine the toxicity of the 1977 effluent conditions as proposed in the NPDES permits to Homestake Mining company and Lead-Deadwood Sanitary District No. 1, Lead, South Dakota; and to determine the suitability of background and receiving waters of Whitewood Creek and Spearfish Creek for support of a cold water fishery. Bioassays of the simulated wastes demonstrated that both effuents are acutely toxic in that test fish were killed within 96 hours. It was indicated that the proposed 1977 permit limitations were inadequate. The combined wastes of the mining company and the sanitary district were considerably more toxic than that of the mining company alone. This was attributed to the complexing of cyanide and chlorine which formed cyanogen chloride. The slime plant and sand plant effluents contained approximtely the same concentrations of cyanide as the simulated wastes; cyanide was found to be the principle toxic agent. Neither heavy metals nor un-ionized ammonia, at levels specified in the 1977 permit, contributed to the toxicity of the tested waters. In situ exposure of rainbow trout demonstrated that Whitewood Creek, in the area upstream from the Gold Run confluence was extremely toxic. (Davison-IPA)

CHARACTERIZATION AND EVALUATION OF WASTEWATER, UNITED STATES STEEL CORPORATION, HOMESTEAD WHEEL AND AXLE PLANT, MCKEES ROCKS, PENNSYL-VANIA, AUGUST 21-28, 1975.

National Enforcement Investigations Center, Denver, CO.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 593, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-330/2-76/019, January 1976. 78 p, 7 fig, 16 tab, 2 ref, 5 append.

Descriptors: *Industrial wastes, *Water pollution, *Ohio River, *Pollutant identification, Effluents, Influents, Water quality control, Outfall sewers, Oil, Phenols, Oil wastes, Trace elements, Zinc, Cyanide, United States Steel Corporation, Homestead Wheel and Axle Plant, Mc Kees Rocks, Pennsylvania, *Allegheny River, Monongahela River, Waste treatment, Monitoring.

Results of a study of the waste water discharges by a United States Steel Corporation (USSC) plant are summarized. Homestead Works occupies three separate areas: the Carrie Furnace area and the Main Homestead areas are on the Monongahela, River upstream of the confluence of the Ohio, Monongahela, and Allegheny Rivers; The Wheel and Axle Works is located on the Ohio River at Mc Kees Rocks, Pennsylvania. Waste waters are discharged from the Mc Kees Rocks plant through three outfalls, 018, 019 and 020, into the Graham Street storm sewer which empties into the Ohio River. Outfall 018 contained only cooling water from the axle forge, and flows ranged from 0.2 mgd to 0.99 mgd during the monitoring with an average of 0.72 mgd. Outfall 019 consisted of untreated cooling water from the power house and the effluent from the oil treatment plant, and flows ranged from 1.38 mgd to 1.71 mgd, averaging 1.62 mgd during monitoring. USSC proposed that TSS and oil/grease be monitored at 119 rather than 019, but since 019 contains flow from all waste sources in the wheel mill and power house it was decided that monitoring should remain at outfall 019. Flow from outfall 020, a non-permitted discharge containing quench water from the machine shop, averaged 2,300 gpd. TSS and oil/grease levels were insignificant during the monitoring. Grab samples from the storm sewer discharge to the Ohio River had low levels of organic compounds not found in USSC discharges. Treatment processes removed approximtely 95% of the influent grease/oil load and 38% of the influent TSS load. USSC methods of determining flows only measure flows from the waste oil treatment facility, all other flows are estimated. (Davison-IPA) W79-02791

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES, UNITED STATES STEEL CORPORATION, DUQUESNE PLANT, PITTSBURGH, PENNSYLVANIA, FEBRUARY 26-MARCH 6, 1976.

National Enforcement Investigations Center, Denver, CO.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 594, Price codes: A07 in paper copy, A01 in microfiche. Report No EPA-330/2-76/024, May 1976. 144 p, 22 fig, 27 tab, 7 ref, 4 append.

Descriptors: *Industrial wastes, *Water pollution, *Monongahela River, *Pollutant identification, Outfall sewers, Water quality control, Oil, Oil wastes, Trace elements, Effluents, Cyanides, Zinc, Ammonia, Phenols, Sampling, Organic compounds, United States Steel Corporation, Duquesne Plant, Monongahela River, Pittsburgh, Pennsylvania, Waste treatment, Monitoring.

Results of a survey of waste water discharges to the Monongahela River from the United States Steel corporation's (USSC) Duquesne Plant are summarized. The Duquesne Plant, located on the west bank of the Monongahela river at Pittsburgh, Pennsylvania, is primarily an iron and steel production facility with some finishing operations. There are seven major outfalls, 011, 012, 013, 014, 015, 016, and 017, and four intermediate outfalls, 111, 211, 1112, and 114, through which all wastes are discharged. Except for process wastes from the blast furnaces, BOF (basic oxygen furnace), primary mills and bar mills, all waste waters are untreated. Treatment facility evaluations included enduent and effluent sampling to determine removal efficiencies. Blast furnace process waste waters, consisting of mostly venturi gas washer flow treated by gravity thickening, were discharged to outfall 111, averaged 6.4 mdg, and contained suspended solids, ammonia, phenolics, cyanide, iron, and zinc. Findings of the in plant monitoring for the other outfalls are discussed and monitoring

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Edgar nia ar consist (BF), mill, ar River water this w from f outfallhela I Creek, from ti were a charge propos load li requirements for seven of the outfalls is presented. It is concluded that USSC monitoring procedures are not sufficient to characterize the waste water quality or determine daily loads because of the widely varying flow. (Davison-IPA)

A CHEMICAL AND BIOLOGICAL EVALUATION OF THREE MINE DRAINAGE TREATMENT PLANTS,
Environmental Protection Agency,
WV. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5D.
W79-02794

DISPOSAL OF DILUTE PESTICIDE SOLU-

Environmental Protection Agency, Cincinnati, OH. Office of Solid Waste Management. For primary bibliographic entry see Field 5E. W79-02795

OWENS-CORNING FIBERGLASS CORPORA-TION WASTEWATER TREATMENT FACILI-TY, ANDERSON, SOUTH CAROLINA, TECH-NICAL SUPPORT PROJECT MARCH-MAY

National Field Investigations Center-Cincinnati,

For primary bibliographic entry see Field 5D. W79-02796

EXPERIENCE WITH WASTE WATER ACID NEUTRALIZATION (ERFAHRUNGEN MIT ABWASSER-SAUREZNEUTRALISATION), For primary bibliographic entry see Field 5D. W79-02798

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES UNITED STATES STEEL CORPORATION, EDGAR THOMPSON PLANT, PITTSBURGH, PENNSYLVANIA, JULY 22-AUGUST 5, 1975.

National Enforcement Investigations Center, Denver, CO.

Denver, CO.

Available from the National Technical Information
Service, Springfield, VA 22161 as PB-255 589,
Price codes: A04 in paper copy, A01 in microfiche.
Report No. EPA/330/2-75/011, December 1975.
76 p, 6 fig, 9 tab, 3 ref, 6 append.

Descriptors: *Industrial wastes, *Water pollution, *Monongahela River, *United States Steel Corporation, Water quality control, Water pollution, water pollution sources, Effluents, Oil wastes, Outfall sewers, Phenols, Zinc, Metals, Cyanides, Monitoring, Sampling, Trace elements, Organic compounds, Pittsburgh, Pennsylvania.

Results of the National Enforcement Investigations Center (NEIC) survey of the waste water sources of United States Steel Corporation's (USSC). Edgar Thompson Plant at Pittsburgh, Pennsylvania are discussed. The Edgar Thompson Plant consists of a sintering plant, five blast furnaces (BF), two basic oxygen furnaces, a 44-inch slab mill, and an ingot mold facility. The Monongahela River supplies the facility with up to 210 mgd of water via two intake stations; a small portion of this water is treated. Waste water is discharged from five outfalls, 001, 002, 003, 004 and 010. All outfalls, except 001, discharge into the Monongahela River; outfall 001 discharges into Turtle Creek, a Monongahela tributary. Waste waters from the outfalls was monitored and samples taken were analyzed. A comparison of the loads discharged during the monitoring period with USSC proposed load limitations reveals that the proposed load limitations reveals that the proposed during six of the seven day monitoring period, and the average daily load was 300% in excess of the proposed limitations. USSC monitored only the portion of the wastes through 002 which contained effluent from the No.1 and 2 BF thickener and cooling water from No. 1 BF and power station No. 2. Non-monitored discharge from this outfall contains ingot mold foundry settling basin effluent,

BF No. 1 cooling water, and Stirling boiler house and No. 1 power station effluents. No. 1 power station waste water was not identified previously to EPA. (Davison-IPA) W79-02801

WIND POWERED AERATION FOR REMOTE LOCATIONS,
Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric

Science.
P. M. Schierholz, W. L. Somervell, Jr., W. Babcock, R. Hartel, and K. Watson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 304, Price codes: A04 in paper copy, A01 in microfiche. Progress Report No. NSF/RA-760238, April 1976. 74 p, 22 fig. 9 tab. AER 75-00833.

Descriptors: *Aeration, *Wind velocity, *Winter-killing, *Windmills, Air circulation, Climatology, Weather, Weather data, Aquatic life, Oxygenation, Fish, Sewage lagoons, Lakes, Design criteria, Water pollution.

Water pollution.

The use of wind powered aerators for the prevention of winterkill was studied. Design criteria for a wind powered aerator stipulates that it be light, easily handled, simple to install, economic and durable. The wind powered aerators for this study were constructed from 'off-the-shelf' and other parts readily available. The windmills tested and their four remote installation sites are summarized. The site at Keenesburg, Colorado, a sewage lagoon, required special equipment. Although the aerator operated all winter, insufficient oxygen was delivered to the lagoon to make a discernable difference in dissolved oxygen, due to the mild winter. At Robber's Roost, a high plains lake, the aerator operated most of the winter where a large hole was kept open in the ice almost all winter; no winterkill was indicated. Wind data for Reagan Lake, a high mountain winterkill lake, show this location has insufficient winds to support a windmill most of the time, and it is suggested that this lake be abandoned. The aerator at Lost Lake, a high mountain winterkill lake, was an experimental design, and although there were numerous problems associated with it, it was operational during the critical period. Fishing here was better than in previous years. Data from the weather stations maintained at the windmill sites and installations at other Colorado locations have not yet been analyzed. (Davison-IPA)

HANDBOOK FOR PESTICIDE DISPOSAL BY COMMON CHEMICAL METHODS, TRW Systems, Inc., Redondo Beach, CA. For primary bibliographic entry see Field 5E. W79-02806

INVENTORY OF INTERSTATE CARRIER WATER SUPPLY SYSTEMS BY STATES AND ENVIRONMENTAL PROTECTION AGENCY

REGIONS.
Environmental Protection Agency, Washington, DC. Office of Water Supply.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 630, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-520/9-74-017, July 1974. 91 p, 12

Descriptors: *Water supply, *Water quality standards, Statistics, *Data collections, Regions, States, Water analysis, Microbiology, Bacteriological data, Certification, Public health, Potable water.

Tabulated data reporting the 1974 certification status of water supply systems serving interstate carriers is presented. The systems are certified annually by Environmental Protection Agency (EPA) Regional Administrators on the basis of recommendations and data submitted by the states. Systems in acutal compliance with the standards are classified as approved. The five provisional classifications are: (1) provisionally approved, (Q),

Water Quality Control—Group 5G

water quality standards are violated; (2) provisionally approved (B), bacteriological sampling requirements have not been met; (3) provisionally approved (F), deficiencies in the facilities reduce its dependability; (4) provisionally approved (O), significant deficiencies in the operation of the system; and (5) provisionally approved (N), available bacteriological data are more than 18 months old. The inventory table is arranged according to EPA regions and the status therin. (Davison-IPA) W79-02808

RESIDUAL MANAGEMENT BY LAND DIS-POSAL, PROCEEDINGS OF THE HAZARD-OUS WASTE RESEARCH SYMPOSIUM. Arizona Univ., Tucson. Dept. of Soils, Water and Engineering. For primary bibliographic entry see Field 5E. W79-02810

TASTE AND ODOR, MISSOURI RIVER, IOWA TRIBUTARIES AREA, IOWA-NEBRASKA,

Environmental Protection Agency, Kansas City, MO. Region VII.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 669, Price codes: A05 in paper copy, A01 in microfiche. Interim Report, 1970. 83 p, 3 fig, 41 tab, 13 ref.

Descriptors: *Water quality, *Baseline studies, *Missouri River, *Omaha, Aquatic microbiology, Biochemical oxygen demand, Coliforms, Munici-pal wastes, Industrial wastes, Water analysis, Monitoring, River systems, Tributaries, River flow, Ac-tivated carbon, Phosphorous, Runoff, Water prop-erties, Taste, Odor, Sampling.

Recurring taste and odor problems experienced by the Omaha waterworks which prompted the Omaha Metropolitan Utility District's request for assistance resulted in this investigation. Previous efforts by local, State, and Federal groups have failed to provide solutions to the problem. Eight sampling sites were selected, and fifteen sample runs at three day intervals were scheduld before and after the expected flush of taste and odor causing materials. The parameter groups selected for study were: baseline and physial parameters; taste and odor related parameters; and nutrient and organic load parameters. Since no sever-taste and odor problems developed during March 1970, some resources were diverted from the survey effort and not all the planned work was accomplished. However, the tributory water produced a noticable impact on the Missouri River at Omaha during the survey period. During the flush priod on the tributory, actinomycete colony counts of 11,000 and 12,000/milliliter were obtained. Higher neutral and weak acid fractions were found in the Missouri River at Omaha and in the Boyer River as opposed to the Missouri River at Yankston by chloroform extracts from activated carbon column samples. The phosphorous and Biochemical as opposed to the Paisson River at Tankston by chloroform extracts from activated carbon column samples. The phosphorous and Biochemical Oxygen Demand loads from municipal and indus-trial waste discharges in the Sioux City area during pre-runoff conditions were a significant part of the total load of these factors in the Missouri River at Omaha. Dissolved and suspended nutrient concentrations increased from pre-runoff to runoff flow levels. (Davison-IPA)

W79-02811

SEICHE STRUCTURE AND VERTICAL MIXING BELOW THE EPILIMNION IN SMALL LAKES, Michigan Univ., Ann Arbor. Div. of Biological Sciences.

For primary bibliographic entry see Field 5C. W79-02813

FIELD ESTIMATES OF AQUATIC PLANT RESPIRATION AND ITS APPLICATION OF STREAM DISSOLVED OXYGEN BUDGETS, Pennsylvania State Univ., University Park. Dept. of Civil Engineering. For primary bibliographic entry see Field 5C. W79-02816

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Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

SOIL MORPHOLOGIC AND HYDRAULIC CHANGES ASSOCIATED WITH WASTEWATER IRRIGATION,

Pennsylvania State Univ., University Park. Dept.

of Agronomy.

of Agronomy.
T. W. Simpson, and R. L. Cunningham.
Available from the National Technical Information
Service, Springfield, VA 22161, as PB-291 399,
Price codes: A10 in paper copy, A01 in microfiche.
Research Project Technical Completion Report,
November, 1978. 201 p, 21 fig. 10 tab, 32 ref, 4
append. OWRT A-045-PA(1), 14-34-0001-8040.

Descriptors: *Waste water irrigation, *Return flow, *Soil physics, Soil structure, Moisture, Soils, Sinks, Water table, Soil temperature, Soil bacteria, Soil treatment, *Morphologic properties(Soils), Hydraulic properties, *Mottling, Flow channels, *Mottling, *Mot

Fifteen topographically matched pit transects were examined in treatment areas. Detailed profile descriptions and sketches were prepared for each transect. The morphologic data were quantified using a relative morphology rating scale developed using a relative morphology rating scate development to show differences in morphologic properties that could be related to hydraulic properties that had been significantly altered due to wastewater irriga-tion. This total score was used to establish suitability levels for sites based on the scores from the relative profile rating scale. Potential longevity of the site for wastewater irrigation was estimated using the average annual percentage of decrease in using the average annual percentage of decrease in the relative profile rating score for all treatments, assuming a linear rate of change. U.S. EPA (1975) guidelines were used to make decisions on suitability using morphologic criteria. Morphologic propertis such as mottling, soil structure and moist consistence have changed due to wastewater irrigation. The 118 and 231 cm per year treatment areas have been altered sufficiently so they are not suitable for irrigation. The 59 cm per year area was considered marginally suitable for continued wastewater irrigation. The soils of the wastewater irrigation site occurred in extremely complex paterials. wassewater irrigation. I ne soils of the wastewater irrigation site occurred in extremely complex patterns prior to irrigation because of landscape overturning due to sinkhole formation and filling. Most flow through soils appears to follow specialized flow channels. (Sisk-Penn State)
W79-02817

INSTITUTIONAL ARRANGEMENTS FOR AREA-WIDE QUALITY PLANNING AND MANAGEMENT, SECTION 208 APPLIED IN THREE METROPOLITAN AREAS OF THE GREAT LAKES,

Michigan Univ., Ann Arbor. Dept. of Civil Engi-

neering.
P. C. Metzger, C. B. Alter, and J. W. Bulkley. Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 433, Price codes: A05 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, East Lansing, Project Completion Report, Jan 1979, 98 p. OWRT A-096-MICH(1), 14-34-

Descriptors: *Area-wide water quality planning, *208 plans, *Institutional aspects, *Management, *Planning, Cities, *Water quality control, *Regional analysis, Legal aspects, *Metropolitan Areas of the Great Lakes, Detroit, Chicago, Cleveland.

The Section 208 legal framework for area-wide water quality planning has been reviewed. Management and control issues of area-wide water quality planning are identified as well as constituquality planning are identified as well as constitu-tional considerations and conflicts in multi-tier government program administration. 208 plans and processes in three metropolitan areas of the Great Lakes are reviewed. The legal framework section is applied in terms of the fulfillment of manage-ment structure requirements for the Detroit 208 area, Chicago 208 area, and the Cleveland 208 area. Variations in the formulation of institutional structures for the 208 areas are noted. The differ-ent roles of the several states in the development of ent roles of the several states in the development of the 208 plans are identified. Resistance to institu-tional change is identified as an important con-straint impacting upon 208 management structure. Institutional factors are identified as the primary

elements acting to limit the applicability in this country of the English and Welsh model of the Regional Water Authority. The proposa by U.S. EPA for implementing water quality programs through a new contractual devise between EPA and each of the states is presented. Lack of information upon this proposal precludes any conclusion as to whether or not the statutorily mandated function of water quality planning and implementation on a regional basis will in fact be maintained. W79.02819 W70-02810

PROBABILISTIC ANALYSIS OF WATER AVAILABILITY IN POWER PLANT SITE SE-LECTION.

Arizona Univ., Tucson. Dept. of Nuclear Engi-For primary bibliographic entry see Field 3E. W79_02834

HOST SPECIFICITY OF CERCOSPORA ROD-MANII, A POTENTIAL BIOLOGICAL CON-TROL OF WATERHYACINTH, Florida Univ., Gainesville. Dept. of Plant Pathol-

For primary bibliographic entry see Field 4A.

CONTROL OF MERCURY POLLUTION, Georgia Univ., Athens, Dept. of Food Science. O. R. Noyes, M. K. Hamdy, and L. A. Muse. Journal of Toxicology and Environmental Health, Vol. 1, p 409-420, 1976. 3 fig. 2 tab, 18 ref. OWRT B-069-GA(2), 14-31-0001-3870.

Descriptors: *Mercury, Rubber, Plastics, Adsorption, Water pollution control, Absorption, Mercury removal

When a 203Hg(NO3)2 solution was kept in glass or polypropylene containers, different fractions of the radioactivity were absorbed on the container walls depending upon the chemical solution being used. The following factors affecting the removal of nercurials from aqueous solution stored in glass were examined: type and concentration of absorbent (fiber glass and rubber powder); pH; pretreatment of the rubber; and the form of mercury used. ment of the rubber; and the form of mercury user.

Rubber was equally effective in the adsorption of organic and inorganic mercury. The pH of the aqueous 203Hg2 + solution was not a critical factor in the rate of adsorption of mercury by the rubber. In addition, the effect of soaking the rubber in water for 18 hr. did not show any statistical in water for 18 hr. did not show any statistical difference when compared with nontreated rubber. It can be concluded that rubber is a very effective adsorbent of mercury, and thus, can be used as a simple method for control of mercury pollution. W79-02885

RAPID METHOD FOR DETERMINING CON-CENTRATIONS OF BAYER 73 IN WATER DURING LAMPRICIDE TREATMENTS, Fish and Wildlife Service, La Crosse, WI. Fish Control Labs

For primary bibliographic entry see Field 5A. W79-02891

THE WHITE AMUR AS A BIOLOGICAL CONTROL AGENT OF AQUATIC WEEDS IN THE PANAMA CANAL, Panama Canal Co., Balboa Heights, Canal Zone. P. E. Custer, F. D. Halverson, J. Malone, and C.

V. Chong. Fisheries, Vol. 3(5), Sept.-Oct. 1978, p 2-9, 6 fig.

Descriptors: Aquiculture, Algae, *Canal zone, Aquatic plants, Aquatic weed control, *Aquatic weed control, Herbivores, Water temperature, Herbicides, Biological treatment, Arkansas, Macrophytes, Methodology, Dissolved oxygen, Fish transport, Laboratory tests, *Biocontrol, *White amur, Acclimation, *Panama Canal Zone, Gatun Labo.

The Panama Canal has been plagued with both floating and submerged aquatic weeds since its

opening. Although more and more money has been spent on herbicides over the years, the weed problem has become more intense. In February 1978 the Panama Canal Company introduced the white amur as a biological tool to control the submerged macrophyte hydrilla to Gatun Lake, the large freshwater reservoir through which the majority of the length of the Canal passes. The first shipment of fish (125,000) did not successfully withstand the rapid change from cold Arkansas water temperatures to the warm tropical waters, with a resultant loss of about 50 percent. A tempering facility to acclimate a second fish shipment was constructed that circulated chilled lake water through a large fish-holding tank for a pericd of two days, during which time the temperature was gradually elevated and salt and disinfectants were added to the water. After tempering, the fish were successfully implanted in isolated arms of the lake, a helicopter being used for transportation. (EIS-Katz) W79-02892

AN APPRAISAL OF THE HYDROGEOLOGI-CAL PROCESSES INVOLVED IN SHALLOW SUBSURFACE RADIOACTIVE WASTE MAN-AGEMENT IN CANADIAN TERRAIN, Department of Fisheries and Environment, Ottawa (Ontario). Water Resources Branch.

For primary bibliographic entry see Field 5B. W79-02926

MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS, Fish and Wildlife Service, Washington, DC. W. L. Longley, R. Jackson, and B. Snyder. Biological Services Program. Report FWS/OBS-78/54. 1978. 66 p.

Descriptors: *Wetlands, *Environmental effects, *Oil industry, Salt marshes, Coastal marshes, Marshes, Ecosystems, Marsh plants, Oil, Oil fields, Drilling, Oil wastes.

General information is presented on the environmental effects on petroleum development activities upon coastal wetlands. Part One consists of brief upon coastal wetlands. Part One consists of brief descriptions of several types of coastal ecosystems, grouped into three categories: uplands, seasonally flooded wetlands, and saturated wetlands and open water. Characteristic vegetation, animals, water regimes, and management practices are included. Part Two deals with the impacts of petroleum development activities, ranging from pre-exploration surveys through termination of production. Depending upon the category of ecosystem involved, the execution of some of the petroleum development activity varies. In addition to describing the activity and its impacts, this chapter contains comments and suggestions that can help to mitigate the effects of each activity. (Steiner-Mass) W79-02931

REEDS CONTROL EUTROPHICATION OF BALATON LAKE, Research Inst. for Water Resources Development, Budapest (Hungary). L. Toth.

Water Research, Vol. 6, p 1533-1539, 1972. 3 fig, 3 tab 13 ref

Descriptors: *Marsh plants, *Sewage effluents, *Water purification, Wetlands, Fresh water marshes, Marshes, Sewage disposal, Waste water(Artificial), Nutrients, Biological treatment,

The effect of effluents from sewage purification plants passing directly into Lake Balaton, Hungary was compared with the effect produced in passing the effluent through a reed wetland first. The phosphorus and nitrogen content of the effluent is utilized by the ha organisms on the reeds in the period of low load in July and during the maximum load in August, and hardly detectable amounts of nitrogen and phosphorus get into the open water of the lake. With regard to lake protection, two conflicting observations were made. The lake is said to be protected by the reeds only

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Evaluation Process—Group 6B

during one season, as in the autumn when the reeds die down the materials retained by them are mixed with lake water by wave-action; on the other hand, the food materials discharged into the reeds and stabilized in the bodies of the living organisms there which are either eaten by fish or leave the water for dry land, might decrease the trophic grade of the lake. (Steiner-Mass)

HATCHERY ALARM SYSTEM TO PROTECT AGAINST CATASTROPHIC EGG OF FISH

National Fish Hatchery White Sulphur Springs, WV. P. A. Stine.

The Progressive Fish Culturist Vol. 40(4), p 167-168, Oct. 1978, 1 fig.

Descriptors: *Aquiculture *Fish hatchery, *Dissolved oxygen, *Fish kills, Fish eggs, Mortalities, Monitoring, Laboratory equipment, Methodology, Dissolved oxygen monitoring, *Hatchery alarm systems, Water level.

A system is described for use in fish rearing estab-lishments to monitor both dissolved oxygen and water levels. (EIS-Katz) W79-0297.

6. WATER RESOURCES **PLANNING**

6A. Techniques Of Planning

IDENTIFICATION AND INITIAL EVALUA-TION OF IRRIGATION RETURN FLOW MODELS,

MUDELS, Irrigation Hydrology Co., Fort Collins, CO. W. R. Walker. Publication No. EPA-600/2-78-144, July, 1978. 124 p, 3 fig. 4 tab, 160 ref, 6 append.

Descriptors: *Return flow, *Mathematical models, Irrigation, Water resources, Water pollution, Water, Simulation analysis, Water quality, Soil water, Soil chemistry, Evapotranspiration.

A broad based literature review was undertaken to identify studies that had yielded digital computer models applicable to irrigation return flow (IRF) systems. The programs not listed in technical reports or papers were requested from the various authors. The resuls of this work are 43 computer models applicable all or m part to the analysis of IRF's and their quality. A brief evaluation of each model is given. IRF modeling technology is well developed theoretically but not completely verified due to the large scale of the irrigation system. Most models remain in the research sphere and need to be redefined for the wider utilization of planners. Field data are generally not available to satisfy the input requirement of most IRF models. Accuracies of predictions need to be determined against standarized conditions in order to further model development and parameter sensitivities model development and parameter sensitivities should be investigated to isolate the most important field data. (Skogerboe-Colorado State)

A PROCEDURE TO DETERMINE DIRECT DI-VERSIONS FROM LAKE MICHIGAN, Illinois Inst. of Tech., Chicago. Dept. of Environ-mental Engineering. For primary bibliographic entry see Field 3D. W79-02523

ENVIRONMENTAL IMPACT ASSESSMENT. Lyndon B. Johnson School of Public Affairs, Austin, TX.

For primary bibliographic entry see Field 6G. W79-02524

SUBJECTIVE DETECTION OF DIFFERENCES IN VARIANCE FROM SMALL SAMPLES,

Arizona Univ., Tucson. Dept. of Civil Engineer-

ing.
R. L. Fike, and W. R. Ferrell.
In: Proceedings American Institute for Decision Sciences, Sixth Annual Meeting, Western Regional Conference, Phoenix, March 17-18, 1977. 5 p, 7 fig, 3 tab, 13 ref, Append.

Descriptors: *Model studies, *Performance, Optimization, Social perception, *Signal detection theory.

Experiments are reported testing people's ability to detect differences in population variance from small samples. The model adopted is that of signal detection theory (SDT), yielding measures of sensitivity that are independent of the response criterion and that can be compared with optimal performance. The results were consistent with SDT. Contrary to expectation, the best performance was very nearly optimal under every condition. Making the mode of presentation more abstract-from visually perceived dispersion of points on a line to numbers to letters to verbal categories-did not significantly affect the high level of relative performance. performance. W79-02597

RESOURCE DEMANDS FOR ENERGY DEVELOPMENT IN THE YELLOWSTONE RIVER BASIN,

CH2M/Hill, Sacramento, CA.; and North Dakota State Univ., Fargo.
For primary bibliographic entry see Field 6D.

AN ECONOMIC ANALYSIS OF ALTERNA-TIVE FEDERAL FLOOD DAMAGE ASSIST-ANCE PROGRAMS. Cornell Univ., Ithaca, NY. For primary bibliographic entry see Field 6F. W79-02824

SYSTEMATIC ASSESSMENT OF UNCERTAIN-TIES IN AN ENVIRONMENT IMPACT STATE-

MENT, Arizona Univ., Tucson. Dept. of Hydrology and Water Resources. For primary bibliographic entry see Field 6G. W79-02882

6B. Evaluation Process

ENVIRONMENTAL ASSESSMENT - ALTER-NATIVES OF GENERAL MANAGEMENT PLAN AND WILDERNESS STUDY FOR CAPE LOOKOUT NATIONAL SEASHORE, NORTH CAROLINA.

National Park Service, Denver, CO. Denver Service Center. For primary bibliographic entry see Field 6G. W79-02525

SUBJECTIVE DETECTION OF DIFFERENCES IN VARIANCE FROM SMALL SAMPLES, Arizona Univ., Tucson. Dept. of Civil Engineer-

For primary bibliographic entry see Field 6A. W79-02597

AQUATIC RESOURCES AND RECREATION BEHAVIOR,

BEHAVIOR, Texas Agricultural Experiment Station, College Station. Dept. of Recreation and Parks. N. H. Cheek, Jr., and D. R. Field. Leisure Sciences, Vol. 1, No. 1, p 67-83, 1977, 7 tab, 9 ref. OWRT A-047-WASH(5).

Descriptors: *Resource base, *Aquatic environment, *Recreation, Recreation participation, Activity clusters, Recreation facilities, Sociology, Social participation.

While substantial effort has been undertaken to understand the consequences of industrial and agri-

cultural uses for the environment, concern has also been expressed about its other uses, including recreation. Little is known about the relationship between recreational behavior and an environmental resource base. This paper focuses upon participation in a specific outdoor recreation activity or activity-cluster and dominant resource base where participation occurs. Resource bases identified were river, lake, ocean, swamp/marsh, forest/mountain, range/farm and city/town. Emphasis is placed upon aquatic environs and participation in water-based recreation. Water activities constituted from 14-30 percent of all outdoor activities taking place at those resource bases identified. Aquatic environments provided the resource base for 38 percent of all recreation participation events, water- and non-water based, occurring during one reporting period. While participation in events, water- and non-water based, occurring during one reporting period. While participation in water-based activities requires a water resource, the array of participation patterns reported sug-gests that resource bases defined as recreation places provide a wide range of opportunities for non-resource-dependent recreation activities. One conclusion is that resource bases cannot be distin-mished by the recreation activities considerate. guished by the recreation activities occurring on them. Resource bases in fact facilitate a wide range of recreation activities, some holding little direct connection with the resource base, nor are the conditions of the resource sufficient to predict behavioral outcomes. W79_02641

A PROGRAM TO PROMOTE IRRIGATION CONSERVATION IN IDAHO,

Idaho Dept. of Water Resources, Boise. For primary bibliographic entry see Field 3F.

OPTIMIZING IRRIGATION SYSTEM DESIGN, Idaho Dept. of Water Resources, Boise. For primary bibliographic entry see Field 3F. W79-02672

SOCIAL OVERHEAD CAPITAL COSTS OF IR-RIGATION DEVELOPMENT IN WASHING-TON STATE,

Washington State Univ., Pullman. Dept. of Agri-cultural Economics. For primary bibliographic entry see Field 3F. W79-02719

LINEAR PROGRAMMING MODEL TO QUANTIFY ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUES OF A TIDAL MARSH, Columbia Univ., New York. School of Engineering and Applied Science.

PhD Dissertation, 1977. 107 p.

Descriptors: *Salt marshes, *Appraisals, *Value, *Economic efficiency, Wetlands, Tidal marshes, Coastal marshes, Evaluation, Cost analysis, Model studies, Social values, Marsh plants.

The formulation of a resource allocation model provides a structure in which economic, scientific, and political considerations are given a place in setting a dollar value on salt marsh. To illustrate the method, data are drawn from the literature of a number of Atlantic Coast marshes to describe a hypothetical composite bay. Typical uses of an estuary are comprised in a linear programming model which is initially solved to determine the mix that maximizes their dollar value. The value of a marginal acre of marsh grass under these circummix that maximizes their dollar value. The value of a marginal acre of marsh grass under these circumstances is given by its shadow price. This varies according to its effectiveness in nutrient removal and its production of detritus. To show the effect of the unquantifiable values of the natural salt marsh, its market price is then increased parametrically to determine alternative resource allocations in which a larger amount of the salt marsh is preserved. As indicated by the shadow price in each case, the additional value of unquantified environmental and social effects must break even with the opportunity cost of providing them. The with the opportunity cost of providing them. The cost increase of each alternative can then be weighed by the decision maker in judging the

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Field 6-WATER RESOURCES PLANNING

Group 6B-Evaluation Process

desirability of preserving more acreage of salt marsh. (Steiner-Mass) 11/70 02722

NEW CONSIDERATIONS FOR MUNICIPAL WATER SYSTEM PLANNING.

Montgomery (James M.)

Water Resources Bulletin, Vol. 14, No. 3, p 542-553, June 1978, 3 fig. 6 ref.

Descriptors: *Municipal water, *Planning, *Effects, Waste water (Pollution), Reclamation, Water reuse, Water conservation, Financial constraints, Public attitudes, Environmental concerns, Enegy utilization, Safe Drinking Water Act, Coordintion.

The primary objectives are to identify new considerations which should be incorporated into the planning of municipal water systems, and to assess the potential effects of these new considerations on traditional planning concepts. Generally, master water plans include analyses of supply and demand, descriptions of existing facilities, and proposed construction programs. Although many master water plans do consider the potential effects of future conditions, recent advances in technology and changing social concerns are beginning to exert a significant influence on the future course of water system development. Some of the new considerations which should be incorporated into municipal water system planning include the Safe Drinking Water Act, coordination with wastewater planning, wastewater reclamation and reuse, water conservation, environmental concerns, energy utilization, financial constraints, and changing public attitudes. In order to provide a responsive and effective framework for future planning of municipal water systems, the influence of these new considerations must be carefully eval-usted in conjunction with traditional planning con-cerns. (Bell-Cornell) W79-02729

FACTUAL INPUTS FOR ALLOCATION DECI-SIONS CONCERNING SCARCE WATER RE-SOURCES,

Washington Univ., St. Louis, MO. Dept. of Technology and Human Affairs.

L. Icerman

Water Resources Bulletin, Vol. 14, No. 3, p 651-662, June 1978. 12 tab, 17 ref.

Descriptors: *Industrial water, *Water utilization, *Water allocation(Policy), *Water resources. *Water allocation(Policy), *Water resources, *Scarce water, Decision making, Water consumption, Patterns, Consumptive use, Crop production, Irrigation, Energy development, Assessment, Cali-

Factual inputs which may be useful for completing first-order assessments to aid decision making on the allocation of scarce water resources are compiled. Water needs of major manufacturing indus-try groups and of minerals industries show wide variations in serveral measures of water use intensi-ty. The chemicals and allied products and primary metals industries dominate the total water intake and consumptive water use by manufacturing in-dustries. Consumptive use per employee for the and consumptive water use by manufacturing in-dustries. Consumptive use per employee for the petroleum and coal products industry groups in nearly 2.5 times higher than that for any other industry group. Estimates of the water require-ments per unit energy output for energy-processing systems vary by as much as an order of magnitude. Agricultural water use is large than that of any other industry but water use for irrigation is any other industry but water use for irrigation is not expected to increase significantly by the year 2020. In California, the production of crop calories and proteins per unit of irrigation water applied may vary by more than an order of magnitude. Crops which offer larger monetary returns per acre are irrigated most frequently. (Bell-Cornell). W79-02731

VALUES AND CHOICES IN THE DEVELOP-MENT OF THE COLORADO RIVER BASIN. American Association for the Advancement of Science, Washington, DC. Committee on Arid Lands. University of Arizona Press, Tucson, 1978. 337 p. Peterson, D.F. and Crawford, A.B., eds. \$7.50.

Descriptors: *River basin development, *Colorado River Basin, *Resources development, *Water uti-lization, Arid lands, Land use, Energy conversion,

The framework for the presentations in this book, divided into 'historical perspectives' and 'future directions', derives from a AAAS symposium sponsored by the Association's Committee on Arid Lands, San Francisco, 1974. As the arid southwest continues developing and changing, the Colorado River Basin and its vast hydrocarbon fuel resources will increasingly be the subject of study. While the Basin's mineral, agricultural, grazing, recreational, wilderness and archaeological resources will come under scrutiny, the River itself remains the dominant value of the region. The use of all the Basin's resources requires a readily available source of water which is, in this case, already completely used or in a transitional stage of use. acie source of water which is, in this case, aireau completely used or in a transitional stage of use While the Colorado may be unique in many ways it is also typical of other arid region river basin. experiencing increasing demands and transitional forces. Discussed here are the general characteristics of the Basin that qualify it as a proper representative of arid zones undergoing similar transitional processes throughout the world. (Tickes-Arizona W79-02732

PHYSICAL SETTING, (COLORADO RIVER

California State Water Resources Control Board. Sacramento.
For primary bibliographic entry see Field 4A. W79-02733

COLORADO RIVER DEVELOPMENT, (COLO-RADO RIVER BASIN),

Upper Colorado River Commission, Salt Lake City, UT. For primary bibliographic entry see Field 6E. W79-02734

POLITICS OF WATER ALLOCATION, (COLO-RADO RIVER BASIN),

Arizona Univ. Tucson or primary bibliographic entry see Field 6E. W79-02735

POLICY GOALS AND VALUES IN HISTORI-CAL PERSPECTIVE, (COLORADO BASIN).

Colorado State Univ., Ft. Collins.

Colorado State Univ., Pt. Collins.

H. P. Caulfied, Jr.

In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 113-120, 1978. University of Arizona Press, Tucson. 5 ref.

Descriptors: *Colorado River basin, *River basin development, *History, *Social values, *Sustained yield, Natural resources, Water yield improvement, Planning, Political aspects, Institution

Development of water and related land policies in river basins of the arid U.S. west are documented here, from the land boom and growing emphasis on irrigation works between 1870-1880, to the present, showing the influence of changing social values. Public values and policies relating to the Colorado River Basin's natural resources can be divided into two periods, the progressive thrust and the period of conservation/preservation thrust. and the period of conservation/preservation thrust. The former, based on the value of individualism embodied in the Carey (1894), Homestead (1862), and townsite (1906) acts, was characterized by anti-monopoly activities and manifestations of egalitarianism. The conservation/preservation thrust, embodied by forces led by Pinchot since the turn of the century, is based on the development and viscous present and viscous control of the century. ment and wise usage of these resources. These policies, reflecting the development movement in America, have been based on the sustained yield concept. This author applies these values and related policy thrusts to the Colorado River Basin specifically, showing how the progressive thrust, for instance, has been manifest in the excess land laws based on the family concept of low-cost power. Conservation interests have been evident by r and d of sustained yield techniques of water and land resources by the Bureau of Land Management land graph college progress. and land resources by the Bureau of Land Management, land grant college programs, the USDA. Historic fluctuations of control and alliance between these two approaches is documented to the present, with this author concluding that it is the strength of political coalition that will determine the effectiveness of present and future policy. (See also W79-02732). (Thickes-Arizona). W79.02736

ENERGY RESOURCES DEVELOPMENT, (COLORADO RIVER BASIN),

Department of the Interior, Washington, DC. For primary bibliographic entry see Field 3E. W79-02737

THE ROLE OF AGRICULTURE, (COLORADO RIVER BASIN).

New Mexico State Univ., University Park For primary bibliographic entry see Field 3F.

RECREATION, (COLORADO RIVER BASIN),

L. E. Royer, and J. D. Hunt.
In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 173-193. University of Arizona Press, Tucson, 1978. 4 fig, 23 ref.

Descriptors: *Recreation, *Colorado River Basin, *River basin development, *Impoundments, *Recreation demand, Recreation facilities, Project planning, Decision making, Water management(Applied), Multiple-purpose.

Because of the lack of heterogeneity in the Colorado River Basin, these authors have rejected the
theory that the Basin as a whole can be considered
prototypic of the recreational opportunities in arid
ands generally. What requires our attention, they
believe, is the role of water, not in the sense of
rainfall or climate conditions but the institutional
organization of the region, its geopolitical arrangements, and the cultural perceptions of the Colorado River itself. They point out that the management of the flow of water in the river has diminished recreational choices and will narrow further
choices in future. If recreation in the drainage
basin is to be developed as one of the outputs of basin is to be developed as one of the outputs of basin is to be developed as one of the outputs of multiple-purpose water development, the recreation opportunity spectrum is fixed by the technological capability of large-scale water impoundment, which in turn is dependent on the magnification of benefits. Several examples are given, however, which indicate an erosion of recreational opportunities and resources in the basin based on political decisions of water choice rather than recreational choice that limit and structure recreationreational choice that minit and structure recreations all futures of the basin. Perceptions based on such water-dependent economic development as the Salt River Project's Navajo Power Plant on the shore of Lake Powell, the use of strip-mined coal from the Black Mesa Mine, and the intrusion of transmission lines into the Paria Canyon Primitive Area, support the contention that this wider continuum of water management strategies has not enhanced the recreation future of the central portion of the Colorado River Basin. (See also W79-02732). (Paylore-Arizona). W79-02739

COMMUNITY DEVELOPMENT, (COLORADO RIVER BASIN),

California Univ., Santa Barbara.

D. E. Mann.

In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 195-219. University of Arizona Press, Tucson, 1978. 2 tab, 25 ref.

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Water Demand-Group 6D

Descriptors: *Community development, *Colorado River Basin, *Southwest U.S., *Urban sociology, Decision making, Rural sociology, Social aspects, Project planning, Economic justification, River basin development, Regional analysis, Regional economics

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Development of urban and rural communities in the Southwest U.S. as described here is based on available general information as well as on data supplied to the author directly by the cities themselves. The diverse nature of such a large area makes a simple analysis difficult and complex, and this study accordingly opts for a discussion of the Southwest US rather than being obliged to observe the hydrological boundaries of the Colorado River Basin. The primary role of the public decision process in determining the environmental character of each sub-region is emphasized in an analysis of population trends in urban and rural areas of Arizona, New Mexico, Colorado, Utah, and California. Community development plans as discussed here are not derived through market forces but rather through individual perception and choice, here are not derived through market forces but rather through individual perception and choice, which may explain in part the significant lack of focus on the role of a diminishing water supply on many community development projects in the arid southwest: people do not 'choose' to acknowledge the area's water realities. Development plans and processes in Albuquerque, New Mexico, Tucson, Arizona, and Farmington, New Mexico, and Pioche, Nevada are presented in an effort to illustrate the manner in which development choices are perceived and carried out. (See also W79-02732). (Tickes-Arizona). W79-02740

CARRYING CAPACITY AND PLANNING, (COLORADO RIVER BASIN),

Utah State Univ., Logan.

A. B. Crawford, and A. B. Bishop. In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p. 292-313. University of Arizona Press, Tucson, 1978. 8 figs, 2 tabs, 2 refs.

Descriptors: *Carrying capacity, *Colorado River Basin, *Regional analysis, *Planning, *Human resources.

For its size, the Colorado River is probably the most utilized, controlled, and fought over river in the world, as these authors point out in an analysis of how the carrying capacity of the Basin's resources may be a key factor in choices about the sources may be a key factor in choices about the region's future growth and development. On the basis of their analysis of the carrying capacity concept, they set forth the parameters of carrying-capacity based planning: identification of driving forces and examinations of the effects of such forces on carrying capacity as well as formulations and implementation of strategies for managing change. They then take up carrying capacity-based planning issues as they relate specifically to the Colorado River Basin: agriculture, environmental quality, and water supply. Their overall posture in defining carrying capacity concepts is a broad one that includes the interactions that occur between human and natural systems, rather than the narrow that includes the interactions that occur between human and natural systems, rather than the narrow one that relates to particular aspects such as maximum sustained yield, for instance. In summary, they maintain that the development of carrying capacity concepts can help extend the usefulness of these indicators into the realm of making comparative evaluations of environmental quality dimensions in terms of ranges and limits of acceptable levels, and the impact of various regional growth policies. (See also W79-02732) (Paylore-Arizona) W79-02741

INSTITUTIONAL ARRANGEMENTS FOR AREA-WIDE QUALITY PLANNING AND MANAGEMENT, SECTION 208 APPLIED IN THREE METROPOLITAN AREAS OF THE GREAT LAKES,

Michigan Univ., Ann Arbor. Dept. of Civil Engi-

For primary bibliographic entry see Field 5G.

ISSUES, INTERESTS AND POWER: ENVIRON-MENTAL POLITICS IN THE COMMUNITY

Delaware Univ., Newark. T. A. Leitko.

T. A. Leitko.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 338, Price codes: A10 in paper copy, A01 in microfiche. Ph.D. Dissertation, June 1977. 190 p, 32 tab, 143 ref, 2 append. OWRT A-031-DEL(1).

Descriptors: *Social aspects, *Political aspects, Delaware, Ohio, *Institutions, Michigan, *Attitudes, *Community development, Water supply, Water pollution, *Social values, Environment, Flood control, *Local governments.

The purpose is to analyze the extent and direction of mobilization of local communities for the solution to water-related problems. Community is defined as a public institution established for actualizing life-style values for the interest groups dominant in the locality. Environmental factors become ing life-style values for the interest groups dominant in the locality. Environmental factors become issues or non-issues as they enter into the local goal setting process. It is hypothesized that water supply is more likely to be perceived as a salient problem in growth oriented communities because it is a precondition for industrial growth and population expansion. Water pollution and flooding are more likely to be perceived as salient problems where residential interests are well organized. Data for this study are from interviews with 160 community leaders (89.3% of the population) in 12 small communities; six in Delaware, four in Ohio and two in Michigan. Findings indicate that political mobilization and growth orientation are higher in verticaly integrated communities. Also, community leaders respond to the surfacing of pollution problems with increasing inactivity and local solvability, and supply problems with decreasing inactivity and increasing local solvability. This indicates that where community leaders implement nondecision making for pollution problems, they implement solutions to supply problems. In both cases they attempt to avoid ties with extralocal agencies. agencies. W79-02825

EFFECTS OF WATER DRAWDOWN ON THE FAUNA IN SMALL COLD-WATER RESER-VOIRS

Colorado Univ., Ft. Collins. For primary bibliographic entry see Field 4A. W79-02830

PROBABILISTIC ANALYSIS OF WATER AVAILABILITY IN POWER PLANT SITE SE-

Arizona Univ., Tucson. Dept. of Nuclear Engineering.

For primary bibliographic entry see Field 3E. W79-02834

SOCIAL IMPACTS FROM WILDLIFE WITHIN THE COLUMBIA BASIN IRRIGATION DIS-TRICT,

Washington State Univ., Pullman. Dept. of Forest and Range Management. J. A. Rajala.

A. A. Aajana.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 339, Price codes: A06 in paper copy, A01 in microfiche. MS Thesis, 1979, 107 p. 4 fig. 29 tab, 57 ref, 2 append. OWRT C-7165(No 6213)(2), 14-31-0001-6213.

Descriptors: *Social impacts, Irrigation projects, Planning, Economic impacts, Fish, *Wildlife, *Recreation, *Washington, Management, *Colum-bia River Basin, *Irrigation districts, *Attitudes,

cts to landowners and recreationists from wildlife in the Columbia Basin Irrigation Project were identified through interviews and a questionnaire. Demographic characteristics and other background information of landowners and recreationiests were statistically compared with their evaluation of the social impacts. Both landowner's and recreationists' appreciation for wild-life was rated on an index of six statements reflect-ing concern for the welfare of wildlife. All nine of the negative social impacts with which landowners agreed were directly or indirectly related to re-creationists. They did not feel they should have to manage recreationists as part of being a private land manager. Landowners disagreed with sug-gested negative impacts from wildlife but felt that the most important positive impacts came from having wildlife on their property and that wildlife contributed to the quality of life in the Columbia contributed to the quality of life in the Columbia Basin. Recreationists agreed with statements reflecting negative social impacts caused by recreationists, such as litter, inconsideration towards landowners, and respect of the landowner's right to control access to his property. Recreationists disagreed with the statement reflecting fear of possible danger from wildlife. The abundance of wildside danger from whichite. The abundance of wide-life was an important consideration in participation by 94 percent of the recreationists. Recreationists agreed with five of the seven suggested elements of agreed with five of the seven suggested elements of satisfaction associated with abundance of wildlife. Recreationists had significantly more appreciation for wildlife on the index than did landowners. Implications for management include promoting proper conduct by recreationists, continuing programs to gain public access to wildlife on private land, promoting wildlife management by private landowners, and providing sufficient numbers of wildlife to maintain the interest of the recreationist and allow for the harvest of diverse satisfactions from the experience. (McKenzie-Washington) W79-02839

A MULTIOBJECTIVE APPROACH TO MAN-AGING A SOUTHERN ARIZONA WATER-

Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
For primary bibliographic entry see Field 4D.

6D. Water Demand

INTERIM REPORT OF THE GOVERNOR'S TASK FORCE ON WATER RESOURCES. Kansas Water Resources Board, Topeka.

December 1977 83 p, 3 fig, 6 tab, 8 photo, 4

Descriptors: *Kansas, *Water resources, *State governments, Water supply, Governments, Groundwater, Groundwater resources, Water resources development, Water quality, Surface waters, Environment.

The Governor's Task Force on Water Resources was charged with: (1) determining the key problems of water supply facing Kansas now and in the future; (2) examining the causes underlying these water supply problems; and (3) identifying options available to the state and local units of government for resolving such problems. This was essentially a progress report which provided some much problems are provided to the provided some much produced to the provided some much provided some much produced to the provided some much provided some mu needed background information on the ground-water resources of Kansas, an overview of the State's water management structure, an identification of management alternatives, and an outline of next year's study plan. Recommendations came from Subcommittees on Groundwater Management and Program Coordination, indicating the priority and attention the Task Force has given to the declining groundwater tables in Western Kansas and the splintered management of the State's eighty water resource programs. The two most significant concepts reflected in the listed recommendations were (1) the confirmation and reaffirmation that the responsibility for managing the State's groundwater resources should remain with local units of government, and (2) the leader-ship in coordinating the funding of the State's water resources programs should be a specific re-sponsibility of the Kansas Water Resources Board. (Froehlich-ISWS)

Field 6-WATER RESOURCES PLANNING

Group 6D-Water Demand

RESOURCE DEMANDS FOR ENERGY DEVELOPMENT IN THE YELLOWSTONE RIVER BASIN,

CH2M/Hill, Sacramento, CA.: and North Dakota

CH2M/Fill, Sacramento, CA.; and North Dakota State Univ., Fargo.

J. W. Knapp, and F. L. Leistritz.

Water Resources Bulletin, Vol. 14, No. 3, p 613-628, June 1978. 1 fig. 3 tab, 10 ref.

Descriptors: *Methodology, *Regional analysis, *Water demand, *Planning, *Energy, *Yellowstone River Basin, Economics, Forecasting, Water resources, Energy development, Analytical techniques, Mathematical models, Demand, Schedule. Systems analysis

Reported is the development of a mathematical model for forecasting energy development in the Yellowstone study area for the years 1985 and 2000, and for determining the associated demands for water, land, labor, capital, and mineral resouces. The study was prepared for use by the Missouri River Basin Commission in conducting a comprehensive 'Level B' planning study of the wate and related land resources in the Yellowstone River Basin. The study results indicate that the amount of coal development in the study area will depend primarily upon state and federal energy policies and regulations. Policies related to slurry pipeline transportation of coal will be particularly important in determining the level and pattern of future energy development in the area. Coal production under the 'most probable' scenario is expected to increase from about 40 million tons in 1976 to 163 million tons per year by 1985, and 513 million tons in the year 2000. Consumptive water use for energy development in the study area could be as much as 556,000 acre-feet per year by the year 2000 (under the high scenario). A parametric analysis was conducted on the 1985 most proble scenario to determine the influence on the study scenario to determine the influence on the study results of variations in the delivered price of water. Water requirements were reduced by nearly onefourth as water costs increased from zero to over \$750 per acre-foot (Bell-Cornell) W79-02726

VALUES AND CHOICES IN THE DEVELOP-MENT OF THE COLORADO RIVER BASIN. American Association for the Advancement of Science, Washington, DC, Committee on Arid Lands. For primary bibliographic entry see Field 6B W79-02732

PHYSICAL SETTING, (COLORADO RIVER

California State Water Resources Control Board, Sacramento

For primary bibliographic entry see Field 4A. W79-02733

RECREATION, (COLORADO RIVER BASIN), Utah State Univ., Logan. For primary bibliographic entry see Field 6B. W79-02739

6E. Water Law and Institutions

LAWS PASSED DURING THE 1976 SESSION OF THE MISSISSIPPI LEGISLATURE (CONCERNING MAINE AND COASTAL ZONE).

Mississippi Univ. Law Center, University. Available from Univ. of Miss. Law Center, Oxford, Miss., Mississippi-Alabama Sea Grant Consortium. Report MASGP 77-010, 1976. 23p.

Descriptors: *Mississippi, *Legislation, *Coasts, *Environmental control, Floods, Hunting, Waterflow, Solid waste disposal, Port authorities, Water supply, Groundwater, Regulation.

This volume represents those laws that were passed during the 1976 Session of the Mississippi Legislature that would affect the use and development of the state's marine and coastal zone. Certain chapters pertain to general administration. Chapter 341 authorizes counties and municipal and private

companies to participate in applicable approved regional solid waste disposal and recovery systems. Chapter 404 provides for posting of land subject to flooding. Chapter 173 empowers municipalities to erect, purchase, operate, and regulate waterworks. Chapter 474 empowers the Mississippi Board of Water Commissioners to delineate capacity use areas of the state where it finds that the use of groundwater requires coordination and limited regulation for the protection of the interests and rights of property owners or the public. Chapter 342 provides for the transportation of solid wastes across Mississippi state lines, establishes ownership of solid wastes. Chapter 452 designates the State Board of Health as the Drink Water supply Regulatory Agency, and outlines the Board's responsibilities. There are also some hunting regulations in this volume. (Horwich-Florida) W79-02526

UNITED STATES SEAWARD JURISDICTION-POST, PRESENT, AND FUTURE.

Mississipp Univ. Law Center, University. Available from Univ. of Miss. Law Center, Oxford, Miss. Mississippi-Alabama Sea Grant Con-sortium. Report MASGP 77-011, 1976. 23p.

Descriptors: *Law of the sea, *International law, Fishing, Federal government, Submerged lands act, Oceans, Analysis, United States.

Seaward jurisdiction is in a state of great change. Even though international negotiations on the Law of the Sea appear to be stalemated, proclamations by coastal nations are changing traditional patterns of ocean use. This paper is an analysis of the jurisdictional zones and how the United States is extending its jurisdiction. The old three-mile terrirextending its jurisdiction. The old three-mile terrir-orial sea concept, although still officially recog-nized by most nations, is being whittled away as certain types of authority-such as exclusive fishing rights-are extended well beyond the three-mile limit. An example is the 1976 United States Fishery Conservation and Management Act. These changes are best understood by extensions of certain rights traditionally associated with the narrow territorial sea, which may be described not only by reference to physical boundaries, but also with reference to certain rights. Concepts such as 'con-tiguous zone,' 'fishing zone,' and 'exclusive eco-nomic control zone' are all extensions of functions of the coastal state in the territorial sea, and repre-sent shrinkage of the freedom of the high seas. Pressures for extension of coastal state jurisdiction in the ocean have been almost entirely economic-prompted by the desire to control natural re-sources. (Horwich-Florida) W79-02527

LAWS PASSED DURING THE 1975 SESSION OF THE MISSISSIPPI LEGISLATURE (CON-CERNING MARINE AND COASTAL ZONE).

Mississippi Univ. Law Center, University. Available from Univ. of Miss. Law Center, Oxford, Miss., Mississippi-Alabama Sea Grant Consortium. Report MASGP 77-009, 1975. 50p.

Descriptors: *Mississippi, *Legislation, *Coasts, *Marine animals, Pesticides, Oil wastes, Waste dis-posal, Regulation, Environmental control, Oysters, Hunting, Forestry.

This volume represents those laws that were passed during the 1975 Session of the Mississippi Legislature that would affect the use and development of the state's marine and coastal zone. Chapment of the state's marine and coastal zone. Chap-ter 318 provides for the use and application of restricted use pesticides and to provide for the certification of applicators. Chapter 496 provides for the financing and construction of areawide waste disposal systems. Chapter 321 amends a 1972 Act and furnishes the Mississippi Marine Conser-vation Commission with jurisdiction and authority over all marine aquatic life. Chapter 308 allows for orderly marketing and easy consumer identification in the retail marketplace of catfish products produced or processed in Mississippi. Chapter 342 deals with the administration and enforcement of

state oil and gas conservation laws. The state Oil and Gas Board has the duty to make rules and regulations-subject to the approval of the Mississippi Air and Water Pollution Control Commission-controlling the disposal of waste products brought to the surface from any oil, gas, or condensate well, and preventing seepage, overflow, or any other type of irreparable damage to the topsoil or surface area. (Horwich-Florida) W79-02528

ACREAGE LIMITATIONS ON BUREAU OF RECLAMATION PROJECTS, Hearing, Subcomm. on Public Lands and Resources, Comm. on Energy and Natural Resources, U.S. Senate, August 11, 1977, Publication No. 95-

Descriptors: *Irrigation water, *Water allocation(Policy), *Water demand, *Evaluation, Water policy, Water permits, Water law, Legal aspects, Water utilization, Water supply, Water districts, Legislation.

The Senate Subcommittee on Public Lands and The Senate Subcommittee on Public Lands and Resources hearing on acreage limitations on federal Bureau of Reclamation projects included consideration of soil, climate, and farming difference methods which affect comparative productive potential of irrigable lands. Testimony of landowners and officials of irrigation districts indicated the present 160 acre limitation applicable to Bureau projects was unreasonable because it was too small for many farmers to make a living with. Senate Bill 242 would provide an equivalency formula under which the Secretary of the Interior would have the authority to change the acreage limitations. The authority to change the acreage limitations. The legislation would not change the class I soil-type 160 acre limitation, but an individual would be 160 acre limitation, but an individual would be eligible to receive water for quantities of class 2, 3, or 4 land equal to 160 acres of class 1 soil. The present reclamation law was passed in 1902 when most farms were small and primitive farm machinery was used. However, modern farming methods are more efficient and only larger farms are profitable. The 160 acre limitation should be updated to reflect modern reality. All testingner given before reflect modern reality. All testimony given before the subcommittee is included. (Rule-Florida) W79-02529

CERTAIN WATER RIGHT CLAIMS OF THE AK-CHIN INDIAN COMMUNITY,

Hearing, Select Committee on Indian Affairs, U.S. Senate, July 25, 1977. 50 p.

Descriptors: *Arizona, *Indian reservations, *Water rights, *Federal government, Irrigation programs, Water utilization, Legal aspects, Aquifer programs, Water utilization, Legal aspects, Aquifer systems, Recharge, Agriculture, Groundwater resources, Water supply development.

This U.S. Senate Select Committee on Indian Affairs (Committee) hearing addresses Senate Bill 1582 which attempts to make available a temporary water supply for the Ak-Chin Indian Community (Indians) in central Arizona, until a permanent supply can be developed. The bill provides that the Indians would waive all claims against the U.S. for the government's past failures as trustee to assert and protect the Indian's water rights—thereby avoiding costly litigation. The Indians have gone from abject poverty to self-sufficiency as a result of the farming of reservation land. The federal government has failed to supply the Indians with their 'Winter's' rights water. To survive, the tribe must pump water from the aquifer at increasing costs. This is causing the aquifer to drop 20-feet per year, resulting in a buckling of reservation lands. The Committee is addressed by a representative of the federal Department of the Interior and Resource Planning Officers from the Bureau of Reclamation. They suggest that a feasibility study of the potential water supply and development costs be undertaken prior to the bill's passage. The bill's authors respond to this suggestion, citing the need for immediate action. All testimony given before the Committee, as well as maps and graphs, are included. (Goldberg-Florida) This U.S. Senate Select Committee on Indian Afare included. (Goldberg-Florida) W79-02530

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Water Law and Institutions—Group 6E

WATER RESEARCH AND DEVELOPMENT (BILLS TO AMEND THE WATER RESOURCES PLANNING ACT AND PROMOTE MORE RE-SPONSIVE NATIONAL WATER RESEARCH PROGRAM).

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Hearing, Subcomm. on Water Resources of the Committee on Environment & Public Works, U.S. Senate, April 7, 1978, Serial No. 95-H54,474p.

Descriptors: *Legislation, *Federal government, *Water resources research act, *Water resources council, Water resources development, Administrative agencies, Comprehensive planning, Desalination, Saline water, Planning, Water policy.

nation, Saline water, Planning, Water policy.

The Subcommittee on Water Resources, part of the United States Senate's Committee on Environment and Public Works, held hearings in 1977 to discuss water research and development. Chaired by Senator Mike Gravel, from Alaska, the subcommittee specifically discussed proposed bills which dealth with the Water Resource Council and the 1974 Water Resources Research Act. Opening statements were made by Senators McClure and Domenici. Senator McClure, while acknowledging that the hearings focused on a bill to extend the life of the Water Resource Council for another year, urged approval of a bill which would change the existing structure of the Council. His alternate bill would place the Council in the White House and strengthen its authority over water resource agencies. The other bill discussed by Senator McClure would provide varied funds for water research programs. Senator Domenici's statements concentrated on desalinization programs. Included in the text are the proposed bills, in their entireties, which were discussed. After the opening remarks were made, witnesses were called to comment on and discuss the bills. (Spiegel-Florida) and discuss the bills. (Spiegel-Florida) W79-02531

EMERGENCY SUSPENSION PROCEDURES FOR OUTER CONTINENTAL SHELF OIL AND GAS OPERATIONS, Geological Survey, Washington, DC. For primary bibliographic entry see Field 5G. W79-02532

FEDERAL CONSISTENCY WITH APPROVED COASTAL MANAGEMENT PROGRAMS, Federal Register, Vol. 43, No. 49, p 10510-33, March 13, 1978. 1 tab.

Descriptors: *Coastal plains, *Federal government, *Administrative decisions, *Adoption of practices, Administrative agencies, Legislation, Regulation, Management, Permits, Continental shelf, Exploration, Environmental effects.

These final regulations provide coastal states, federal agencies, and other affected parties with policies and procedures for the implementation of the federal consistency provisions of the 1977 Coastal Zone Management Act, as amended. These regulations are issued by the National Oceanic and Atmospheric Administration (NOAA). The NOAA has attempted to minimize the likelihood of unnecessary delay in the administration of federal programs. However, the NOAA has favored comprehensive and complex coverage over simplicity to avoid uncertainty and conflict. The NOAA is still committed to the goal of implementing a federal consistency system which not only promotes the substantive coastal management purposes of the Act but also fosters the Act's objective of expeditions intergovernmental coordination. A matrix diagram which makes distinctions among the various types of federal actions subject to the Act's federal consistency requirements is included. A These final regulations provide coastal states, fedfederal consistency requirements is included. A detailed discussion of specific comments and the NOAA's responses is also included. It was determined that environmental and inflationary impact statements were not required in this instance. (Quarles-Florida) W79-02533

MINERAL MINING AND PROCESSING POINT SOURCE CATEGORY EFFLUENT

GUIDELINES AND STANDARDS: PHOS-PHATE ROCK MINING, For primary bibliographic entry see Field 5G. W79-02534

COASTAL ZONE MANAGEMENT APPROVAL REGULATIONS, Federal Register, Vol. 43, No. 41, p 8378-8342, March 1, 1978. 6 tab.

Descriptors: *Coastal plains, *Federal government, *Administrative decisions, *Adoption of practices, Administrative agencies, Development, Management, State governments, Regulation, Planning, Natural resources, Water quality.

Natural resources, Water quality.

The National Oceanic and Atmospheric Administration (NOAA) has promulgated these interim final regulations seeking to revise and incorporate several sets of existing regulations dealing with development and approval of state coastal management programs. These regulations reflect more accurately the interpretation of program approval requirements being provided by the Office of Coastal Zone Management. The NOAA also wishes to respond to requests to discuss further some of the major issues addressed in the regulations prior to their finalization. Such an open process follows the spirit of the 1972 federal Coastal Zone Management Act, as amended. The interim final regulations include a discussion of the major issues and a section-by-section discussion of other comments received. Some reviewers felt the regulations did not adequately reflect the goal of preservation of unique coastal resources. Changes were made to emphasize the relationship between the proposed energy facility planning requirements and national interest considerations. The treatment of local programs is explored. The NOAA agreed that a more detailed performance review should be provided after program approval. If states have more stringent pollution control standards, these must be incorporated into the management program. (Quarles-Florida)

LEGISLATION AND REGULATION: WHAT'S NEW WITH PL 92-500, For primary bibliographic entry see Field 5G. W79-02537

THE CLEAN WATER ACT OF 1977,
For primary bibliographic entry see Field 5G.
W79-02538

TIDELANDS AND THE PUBLIC TRUST: AN APPLICATION FOR SOUTH CAROLINA, B. W. Wyche.

Ecology Law Quarterly, Vol. 7, No. 1, p 137-70,

Descriptors: *Coastal marshes, *Ownership of beds, *Intertidal areas, *South Carolina, Tidal marshes, Marshes, Wetlands, State jurisdiction, Ri-parian rights, Public benefit, Environmental con-trol, Judicial decisions.

Tidelands of coastal states are now recognized as resources of immense public value. As a means of protecting these lands against abuse and destruction, courts generally apply the public trust doctrine: tidelands, as well as lands underlying navigable, non-tidal waters, are held in trust for the benefit of the public. Whether tidelands are held in trust in South Carolina is open to question. The state is the presumptive owner of all South Carolina tidelands, but a private claimant can rebut this presumption by producing an unbroken chain of title back to an original grant from the sovereign and by showing specific language in the grant evincing the intent to convey the land to the mean low water mark. However, the South Carolina Supreme Court has declared in dicta that tidelands are held in trust for public purposes. This position is consistent with common law principles and decisions of state courts and the United States Supreme Court. However, the South Carolina Supreme Court has not defined or explained the scope,

nature, and limitations of the tidelands trust. Pre-sumably the trust encompasses all tidelands, not just those abutting navigable waters. (Rule-Flor-ida) W70.02530

NEGLECTED MARINE SANCTUARY LAW IS SHOWING SIGNS OF LIFE, D. Laist.

Audubon, Vol. 83, No. 3, p 117-19, 1978.

Descriptors: *Legislation, *Aquatic life, *Protection, *Preservation, Marine animals, Ecosystems, Great lakes, Continental shelf, Coasts, Administrative agencies, Marine plants, Conservation.

tive agencies, Marine plants, Conservation.

Title III of the 1972 Marine Protection, Research, and Sanctuaries Act could prevent the despoliation of many of our nation's most valuable offshore areas. Title III calls for the establishment of marine sanctuaries, and after almost five years of neglect, the law is showing signs of vitality. The law provides authority for presidential approval of sanctuaries, and after almost five years of neglect, the law is showing signs of vitality. The law provides authority for presidential approval of sanctuaries as far seaward as the edge of the continental shelf, in other coastal waters subject to the ebb and flow of the tide and in the Great Lakes and their connecting waters. The five categories of marine environment that can justify sanctuary status are: (1) habitat areas; (2) species areas; (3) recreation and esthetic areas; (4) research areas; and (5) unique areas. The operation of the marine sanctuaries program is discussed, as is its history. The author offers several explanations of why, until recently, the program has progressed at a slow pace. The turning point for the present brighter outlook for the program is attributed to President Carter's support for it in his 1977 environmental message. Since then, the program has been funded and administered by the National Oceanic and Atmospheric Administration. (Horwich-Florida) W79-02540

STATE LAW CONTROLS TITLE TO ALLU-VIAL FORMATIONS EVEN THOUGH ORIGI-NAL TITLE IS BASED ON EQUAL-FOOTING DOCTRINE OR FEDERAL GRANT,

Texas Tech Law Review, Vol. 9, No. 2, p 381-91, Winter, 1977-78.

Descriptors: *Federal-state water rights conflicts, *Alluvium, *Accretion(Legal aspects), *Riparian rights, Legal aspects, Water law, Water policy, Federal jurisdiction, Water rights, Ownership of beds, Judicial decisions, Analysis.

beds, Judicial decisions, Analysis.

Under the United States Supreme Court case of Oregon ex rel. State Land Board v. Corvallis Sand and Gravel Company, state law controls title to allovial formations even though original title is based on the equal-footing doctrine or federal grant. Even though the case was argued in terms of correct application of federal common law, the court decided the jurisdictional question of whether state or federal law should control title determinations of modified riverbed lands. State law should control unless some theory or factual situation indicates that federal grant claims did not govern. The decision to overrule Bonelli Cattle Company v. Artizona, which based federal jurisdiction of the equal-footing doctrine, was sound. However, the decision on federally granted riparian land was faulty because the court failed to distinguish between riparian rights associated with a federal grant and the equal-footing doctrine as possible sources of federal jurisdiction. Instead of deciding whether the facts contained an accretion issue, the court applied the same rational to grants that it did to the doctrine. (Rule-Florida)

THE WATER QUALITY IMPROVEMENT ACT OF 1970, THE 1972 AMENDMENTS AND STATE ANTIPOLLUTION LAWS, For primary bibliographic entry see Field 5G. W79-02542

Field 6-WATER RESOURCES PLANNING

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BANNING DETERGENT PHOSPHATES . THE DEBATE CONTINUES.

For primary bibliographic entry see Field 5G. W79-02543

CALIFORNIA'S PROGRAM FOR DEALING WITH THE DROUGHT.

California State Dept. of Water Resources, Sacramento. R. B. Robie.

Journal of the American Water Works Associ-ation, Vol. 70, No. 2, p 64-68, 1978.

Descriptors: *California, *Water shortage, *Remedies, *Droughts, Precipitation(Atmosphere), Reservoir storage, Water supply, Water storage, Groundwater basins, Surface waters, Water conservation, Drought tolerance.

Recently, California, along with much of the West, experienced some of the most severe drought conditions ever experienced. Nevertheless, California has been able to cope with the drought and may even be in a better position to prepare for future dry periods. California generally has only one rainy season each year, so numerous reservoirs have been built to store the runoff. As a result of the drought, groundwater levels around the state have dropped drastically. Agriculture and closely related industries have been hardest hit by the drought. Water rationing has been implemented in many urban areas. Other problem areas affected by the drought include fires, fish and hydroelectric power. The state Department of Water Resources has learned several lessons from the drought, and these are set forth. California has taken a number of actions to cope with the drought. The Governor's Drought Emergency Task Force was created. Many communities embarked upon voluntary and mandatory local conservation programs. Water exchanges and temporary diversions were arranged. The Department of Water Resources initiated a cloud seeding program. Other specific plans to cope with the continued drought are also set forth. (Quarles-Florida)

CONSUMER NOTIFICATION - PUBLIC AWARENESS OR THE SMOKING PISTOL, California State Dept. of Health, Berkeley. For primary bibliographic entry see Field 5G. W79-02545

OVERVIEW OF FEDERAL GROUNDWATER PROTECTION LEGISLATION AIDS ENVI-RONMENTALISTS,

Environmental Protection Agency, Washington, DC. Criteria and Standards Div.

For primary bibliographic entry see Field 5G. W79-02546

NONDETERIORATION AND THE PROTEC-TION OF HIGH QUALITY WATERS UNDER FEDERAL WATER POLLUTION CONTROL

For primary bibliographic entry see Field 5G. W79-02547

ENVIRONMENTAL REGULATION UNITED STATES DEEP SEABED MINING. Marshall-Wythe School of Law, Williamsburg, VA.
S. C. Whitney.
William and Mary Law Review, Vol. 19, No. 1, p 77-97, Fall, 1977.

Descriptors: *International waters, *Mining, *Exploitation, *Law of the Sea, United States, Regulation, Manganese, Technology, United nations, Oceans, Negotiations.

The deep-sea mining of managanese nodules is inevitable given increasing industrial demands and available economic and technological resources. This article concludes that Congress should enact legislation providing a guaranteed security for cor-porate investment and effort subject to compliance

with sound regulatory and environmental principles. The author also suggests that an effort should be made to influence foreign countries to adhere to sound environmental safeguards in order to advance the goal of efficient, responsible exploitation of the seabed's natural resources. This could be accomplished through bilateral negotiations and agreements which could provide a basis for the emergence of favorable customary international law that would promote the negotiation of a viable Law of the Sea agreement. This article examines the nature of deep seabed mining and proposes a legislative framework within which commercial mining ventures could operate effectively. The article then discusses the problems which the United States faces when attempting to promote responsible development of deep-sea mining in a hostile international community. The international environment regime of law which will control exploration and exploitation until a Law of the Sea treaty is finalized, is also discussed. (Quarles-Florida) W79-02548 W79-02548

THE SEABED NEGOTIATION AND THE LAW OF THE SEA CONFERENCE -- READY FOR A

J. T. Smith, II. Virginia Journal of International Law, Vol. 18, No. 1, p 42-59, Fall 1977.

Descriptors: *Law of the sea, *United nations, *Resource allocation, *Negotiations, International waters, Oceans, Continental shelf, Natural resources, Mining, United States, Exploitation, International law.

The procedural and substantive obstacles to successful conclusion of the seabed negotiations of the Third United Nations Conference on the Law of the Sea are so large that means must be found to divorce them from the rest of the Conferences work. This is the conclusion of this article which work. This is the conclusion of this article which warns that, absent such a separation, the success of the entire Conference may be jeopardized. The most overt sign of restlessness in this area of negotiation has been the United States' statement that the portion of the new informal Composite Negotiating Text dealing with the seabed regime is fundamentally unacceptable. While the United States undertakes a serious review of conference substance and procedures, Congress is preparing legislation which will encourage American firms to stance and procedures, Congress is preparing legislation which will encourage American firms to mine the seabed despite the absence of an agreed-upon international regime. Other nations are also growing anxious over this troubled area of negotiation. The article examines the procedural failure of the Conference and the substantive obstacles of the seabed negotiations. Alternatives for resolving the seabed roadblock are suggested with a detailed plan of divorcing the seabed negotiations from the Conference. (Quarles-Florida)
W79-02549

SUBSIDENCE OF LAND CAUSED BY WITH-DRAWAL OF PERCOLATING WATER IS AC-TIONABLE ON THE THEORIES OF NEGLI-GENCE AND NUISANCE IN FACT,

E. L. Huddleston. Texas Tech Law Review, Vol. 9, No. 2, p 392-401, Winter 1977-78

Descriptors: *Texas, *Judicial decisions, *Water rights, *Remedies, Nuisance, Negligence, Groundwater, Percolating water, Subsidence, Natural flow doctrine, Reasonable use, Land subsidence.

In Smith-Southwest Industries v. Friendswood Development Co., the Houston (Texas) Court of Civil Appeals held that subsidence of land caused by withdrawal of percolating water is actionable on the theories of negligence and nuisance in fact. Texas water law follows the English rule which allows a landowner to withdraw unlimited amounts of water without liability for injury to a neighbors well. However the tort law of negligence and nuisance can impose liability for subsidence of land. A person who uses his land in a negligent manner and causes injury to another's property is liable for their negligence. And to find property is liable for their negligence. And to find a nuisance, a court weighs the injury to the plain-

tiff against the reasonableness and usefulness of the defendant's activity. Although the Houston court indicated that it solved the contradictions between the two laws-water law and tort law-by blending them, the author maintains that the court simply ignored the English rule, and recommends the Texas Supreme Court solve this conflict by abandoning the English rule completely. While the English rule may have been practical in earlier days, it has been rendered obsolete by societal changes. (Horwich-Florida)
W79-02550

EQUAL FOOTING DOCTRINE DOES NOT RE-QUIRE APPLICATION OF FEDERAL COMMON LAW TO RESOLVE OWNERSHIP OF LAND UNDERLYING NAVIGABLE WA-TERWAYS WHICH ARE NOT INTERSTATE BOUNDARIES,

C. E. Hagberg. Tulsa Law Journal, vol. 12, no. 3, p 593-99, 1977.

Descriptors: *Riparian land, *Ownership of beds, *Judicial decisions, *Avulsion, River beds, Navigable waters, Common law, Federal-state water rights conflicts, Accretion(Legal aspects), Submerged lands act, Oregon, State jurisdiction.

merged lands act, Oregon, State jurisdiction.

In Oregon ex rel State Land Board v. Corvallis Sand and Gravel Co., Oregon brought an ejectment action, claiming title to two parcels of land. The first parcel had been part of a riverbed since before Oregon was admitted to the Union. The second became a riverbed in 1909, after statehood, following a major flood. The trial court-affirmed by the Oregon Court of Appeals--awarded ownership of the first parcel to the State. The 'equal footing doctrine' requires that newly admitted states acquired title to the riverbeds of all navigable waterways within their boundaries. The court applied the federal common law theory of avulsion to the second parcel and awarded it to the defendant. The case was reversed by the United States Supreme Court, which also reversed its former policy of expanding the situations where federal common law would apply. Thus state law shall govern the impact of accretion, avulsion, and remergence upon ownership of land surrounding or underlying navigable waterways that do not form interstate boundaries. The author defends this decision, because states have unique interests in, and interstate obtained and the author defends this decision, because states have unique interests in, and varying public policies with respect to, riparian lands. (Horwich-Florida) W79-02551

SURFACE WATER FLOODING IN URBAN AREAS: RIGHTS AND REMEDIES UNDER THE COMMON ENEMY DOCTRINE,

J. P. George. Tulsa Law Journal, Vol. 12, No. 3, p 574-92, 1977.

Descriptors: *Surface runoff, *Remedies, *Urban drainage, Floods, Common law, Urban runoff, Land development, Drainage effects, Urban devel-opment, Drainage.

Urban flooding is an ever increasing problem as land development intensifies in expanding metropolitan areas. Surface runoff can submerge land not ordinarily considered subject to flood damage. This article examines common law remedies available to resolve surface water drainage problems as exemplified in three geological situations. Its scope is limited to jurisdictions employing the modified common-enemy doctrine. The three situations are: (1) when the landowner is on the lower end of a watershed and upper development causes increased runoff velocity or volume; (2) when the landowner occupies a depression and subsequent development causes standing or slow draining water; and (3) when the landowner is the recipient of collected artificial discharge from another landowner. The artificially collected discharge generally involves negligence and a lack of good faith. Available remedies are injunctive relief, damages, or both. But the single lot depression and the increased general runoff problems usually present situations where no cause of action will lie unless the damaged party can show lack of care, excessive damage or malice, or can demonstrate that a

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more adequate drainage system is feasible. This is because these problems arise from normal urban growth. (Horwich-Florida) W79-02552

SOMETHING OLD, SOMETHING NEW: SOME THOUGHTS ON GROTIUS AND THE MARINE ENVIRONMENT,

Virginia Journal of International Law, Vol. 18, No. 1, p 147-64, Fall 1977.

Descriptors: *Law of the sea, *International law, *United Nations, *Conferences, International waters, Exploration, Exploitation, Compensation, Appropriation, Political aspects, Regulation.

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Appropriation, Political aspects, Regulation.

The United Nations has had three conferences on the Law of the Sea (UNCLOS). Discussed here are the proposals and faults of the Third Conference (UNCLOS III) which took place in 1978. Coastal states will have, according to the proposals, sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living of their 200-mile economic zone. However, there shall be preserved in all 'economic zones' the traditional high seas freedoms for all states, such as navigation and overflight and of the laying of submarine cables and pipelines. The author criticizes the Convention for not adequately recognizing problems relating to the marine environment. The proposal states that in exercising its prerogative in this area, a coastal state must not hamper innocent passage which is not innocent, which has traditionally meant only passage which is not prejudiced to the peace, good order or security of the coastal state. The author argues that pollution should be included in the category of 'not innocent.' Environmental protection must be given a more important place in attempts at international cooperation. (Horwich-Florida)

W79-02553

PROTECTING THE CALIFORNIA COAST. Sierra Club Bulletin, Vol. 63, No. 5, p 11-12, June, 1978.

Descriptors: *California, *Coasts, *Planning, *Land development, Legislation, State governments, Permits, Conservation, Sewage, Beaches, Dredging, Wetlands.

Protecting the California coast from unrestricted development has not been an easy task. The turning point in the battle was the creation in 1965 of the San Francisco Bay Conservation and Development Commission. The Commission was the catalyst and model for a state-level coastal conservation program in the 1970's. The 1972 Coastal Initiasyst and model for a state-level coastal conservation program in the 1970's. The 1972 Coastal Initiative was finally passed to enact a statewide coastal
protection law. The 1972 Coastal Act did not halt
all coastal development but it did alter future
coastline development. The law's most important
effect was to enable the state to acquire parklands
in desirable areas previously dominated by private
landowners. Another result of the law was the
preparation of the 1975 California Coastal Plan
which stresses the idea that the coast should be
treated as a unique place, where conservation has
priority. Upon the expiratin of the 1972 Act in
1976, a weakened Coastal Act was passed, establishing a permanent California Coastal Commission. The Commission must rely on local governments and state and federal agencies to implement
the new Act. The program has presently reached a
critical point, with numerous controversies and
opposition surrounding it. (Quarles-Florida)
W79-02554

ESTABLISHING LIABILITY FOR DAMAGE RESULTING FROM THE USE OF UNDER-GROUND PERCOLATING WATER: SOUTH-SOUTHWEST INDUSTRIES V. FRIENDS-WOOD DEVELOPMENT COMPANY,

D. A. Wright. Houston Law Review, Vol. 15, No. 2, p 454-68,

January 1978.

Descriptors: *Texas, *Subsurface waters, *Reasonable use, *Judicial decisions, Damages, Percolating water, Withdrawal, Water levels, Negligence, Water rights, Groundwater, Subsidence.

Texas landowners brought a class action suit against a corporation alleging that the withdrawal of large quantities of percolating, subsurface water from beneath defendant company's land caused a severe subsidence of plaintiff's property. The trial court granted defendant's motion for summary judgment on the basis of the common law rule that judgment on the basis of the common law rule that a landowner has an absolute right to the water beneath his property. The appeals court reversed, stating the plaintiffs had a right of action based upon negligence and nuisance. The author views this decision as contrary to common law doctrine. The rationale for the seemingly harsh rule is explained and its adoption by Texas courts is traced. However, the majority of other states follow the doctrine of reasonable use. The various rules relating to property rights in subterranean waters are examined in some detail. The article urges the Texas Supreme Court to adopt the second of three options available in this water rights area: (1) make the absolute-use doctrine subject to tort liability for negligence; (2) adopt the doctrine of reasonable use; or (3) recognize that the common law rule was use; or (3) recognize that the common law rule was never intended to deal with situations where the damage was land subsidence. (Quarles-Florida) W79-02555

ORGANIZING FOR A NATIONAL OCEANS PROGRAM.

Virginia Univ., Charlottesville. School of Law.

William and Mary Law Review, Vol. 19, No. 1, p 1-15, Fall, 1977. 4 app.

Descriptors: *Oceans, *Administrative agencies, *United States, *Water conservation, Beaches, Legislation, Natural resources, Continental shelf, Federal government, Mining, Planning, Water

without a national oceans policy, the United States will continue to drift toward increased pollution of its beaches and lagging oceans development. Although great strides have been made toward the development of a national oceans program, we have reached a critical point in oceans policy. The principal organizational needs of a national oceans policy are: (1) upgrading the attention given the oceans in overall national priority; (2) development of national oceans goals and implementation programs; (3) centralization of oceans programs; and (4) more effective interagency coordination and Presidential oversight of programs. In order to reduce organizational weaknesses and build toward a national oceans program, the author suggests three modest changes; (1) creation of a Cabinet-level Marine Affairs Council to develop national ocean goals; (2) creation of an independent centralized agency reporting directly to the President; and (3) reorganization of the State Department's oceans effort into a genuine Bureau of Oceans and Environment. The basic reason given for these proposed changes is the lack of clear oceans goals in the nation's present policy. Diagrams illustrating the proposed organization of the suthor's suggestions are included. (Quarles-Florida) W79-02556

HODGES V. OKLAHOMA WATER RE-SOURCES BOARD (WATER RESOURCES BOARD GRANT OF TEMPORARY PERMIT FOR NON-DOMESTIC GROUNDWATER USE

580 P. 2d 980-83 (Okla., 1978).

Descriptors: *Irrigation water, *Beneficial use, *Domestic water, *Oklahoma, Preferences(Water rights), Water permits, Administrative decisions, water demand, Water districts, Competing uses, Water districts, Competing uses, Water districts (Applied), Water allocation(Policy) allocation(Policy).

Appellees Oklahoma Water Resources Board and Appellees Oklahoma Water Resources Board and permit applicant appealed a trial court ruling which reversed the Board's order granting a temporary permit to take and use ground water for spray irrigation. The trial court held that the Board's findings of a beneficial use and lack of waste were not supported by substantial competent evidence. The court also felt the Board had failed to address appellant local resident's argument that domestic ground water uses have priority, and the permit use would have a detrimental effect on domestic uses. Reversing the trial court, the Oklahoma Supreme court reinstated the Board order domestic uses. Reversing the trial court, the Okia-homa Supreme court reinstated the Board order and held that spray irrigation could be a beneficial use, and that once an applicant shows what method he intends to use for irrigating a particular area, the Board has the authority to determine that a waste will or will not occur. Protestors who feel a waste will or will not occur. Protestors who feel waste will occur must present their evidence to the Board. In this case, such evidence presented was deemed inconclusive. Additionally, the Supreme Court held that simply because it is not necessary to obtain a permit before taking water for domestic uses does not mean such uses have priority over water put to other beneficial use. (Rule-Florida) W79-02557

BUTTS V. CITY OF SOUTH FULTON (CON-STRUCTION OF ROAD WHICH INTERFERED WITH NATURAL DRAINAGE AND CAUSED FLOODING CONSTITUTED ACTIONABLE NUISANCE

565 S.W. 2d 879-83 (Tenn. Ct. App. 1977).

Descriptors: *Alteration of flow, *Flood damage, *Surface drainage, *Tennessee, Roads, Drainage, Surface runoff, Rain water, Surface waters, Flood control, Damages.

Plaintiff property owner brought action for money damages resulting from contruction of a road which interfered with natural drainage and caused water to back up and flood his land. The property had never been flooded or damaged by flood water before the construction. Defendant municipality before the construction. Defendant municipality had been informed that the lack of adequate drains could cause water back-up, but failed to install additional tiles to carry off the water. As a result, the road formed a dam which blocked the natural flow of water. When large amounts of rain fell, the water accumulated and flooded plaintiff's property. The Tennessee Court of Appeals held that wrongful interference with natural drainage of surface water which causes injury to an adjoining landowner constitutes an actionable nuisance. The court affirmed the trial court award of damages, but reversed an order requiring defendant to lower but reversed an order requiring defendant to lower the road level or to install a pump and submit plans for removing water. The appeals court felt the order placed the trial court in a supervisory posi-tion for which it had not expertise, and that there were alternative remedies available. (Rule-Florida)

RULES AND PROCEDURES FOR APPLICA-TION FOR COASTAL CONSTRUCTION PER-

Florida Dept. of Natural Resources, Tallahassee. Div. of Marine Resources.

Fla. Admin. Code, Ch 16B-24, secs 24.01 thru 24.09 (1978).

Descriptors: *Permits, *Florida, *Regulation, *Coastal structures, Legislation, Project planning, Administrative agencies, Construction, Coasts, Engineering, Beaches.

In pursuance with Florida statutes, these rules are promulgated to implement departmental policies and procedures for applying for any coastal construction permit. The regulations described herein deal with the permit application process and with conditions placed on such permits. Generally, no erosion control structure may be constructed or modified unless a valid permit has been issued by the Department of Natural Resources (Department). This rule does not apply if the Department's Division of Marine Resources determines that the activity is not covered by the regulations. In order to obtain a permit an application must be submitted

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to the Bureau of Beaches and Shores (Bureau). Information such as evidence of ownership as to the land in question and a set of contruction plans must be included. All applications must be accompanied by a fee, unless the applicant is a governmental unit. If the project is acceptable, notice will be mailed to parties interested in the proposed structure in order to obtain their recommendations. Later, the Bureau shall make its final recommendations. Accepting a permit imparts a duty on the applicant to follow all permit conditions imposed by the Department. (Spiegel-Florida)

NIAGRA OF WISCONSIN PAPER CORP, V. WISCONSIN DEPT, OF NATURAL RESOURCES (STATE EFFLUENT DISCHARGE PERMITS MUST BE MODIFIED IN ACCORDANCE WITH STATE LAW TO COMPLY WITH EPA STANDARDS.
268 N.W. 2d 153-64 (Wis. 1978).

Descriptors: *Effluents, *Federal water pollution control act, *Permits, State jurisdiction, Regulation, Water quality standards, Pollution abatement, Technology, Phosphates, Waste water treatment, Industrial wastes

Two paper companies instituted actions against the Wisconsin Department of Natural Resources (DNR) when the DNR refused to alter Wisconsin Pollution Discharge Elimination System permits it rereviously issued to the companies. The permits incorporated interim effluent limitations based upon guidelines published by the federal Environmental Protection Agency (EPA), and were to be in effect until 1978. However, the permits were to be modified in 1977 following the EPA's scheduled adoption of 'best practicable control technology currently available' effluent limitation standards. The final standards adopted by the EPA in 1977 were less stringent than those in the original DNR permit. The state supreme court held that because of a state law requiring that DNR rules relating to effluent limitations shall comply with and not exceed the 1977 EPA requirements, the original permits should have been modified to comply with the less stringent and final 1977 EPA standards. Finally, noting the difference between effluent limitations and water quality standards, the court ruled a phosphorus limitation in the permit could not be retained unless the DNR could link its necessity to an actual water quality standard violation. (Easterbrook-Florida)

OKLAHOMA WATER RESOURCES BOARD V. CITY OF LAWTON (SPRINGWATER HEATED AS STREAM WATER FOR APPROPRIATION PERMIT APPLICATION), 580 P. 2d 510-14 (Okla. 1978).

Descriptors: *Oklahoma, *Competing uses, *Appropriation, *Spring waters, Administrative agencies, Streams, Water users, Water consumption(Except consumptive uses), Permits, Land development, Irrigation, Municipal water.

A private landowner was granted a temporary permit to appropriate 400 feet of ground water annually for recreation, housing development and commercial irrigation uses by the Oklahoma Water Resources Board. Lawton city officials objected, claiming the water to be appropriated was part of the watershed that would normally drain into the lake which supplied the city with water. A trial court reversed the Board. Affirming the trial court, the state supreme court held that even though the water to be appropriated came to the surface in the form of a spring and ran across the surface in a nondefinite course for such a short distance it did not constitute a 'definite' stream, it could nevertheless only be appropriated as stream water, not ground water. And, to appropriate stream water, the court noted the Board must make certain statutory determinations, including: (1) there is unappropriated water available in the amount applied for; (2) a present or future need for the water exists, and the proposed water use is a benefiticial use; and (3) the proposed use does not interfere

with domestic or existing appropriative uses--like that of Lawton. (Easterbrook-Florida) W70.02561

KUIPER V. WARREN (CONDITIONAL WELL PERMIT OWNER MUST APPLY WATER TO BENEFICIAL USE OR LOSE PERMIT). 580 P. 2d 32-36 (Colo. 1978).

Descriptors: *Colorado, *Well permits, *Well regulations, *Beneficial use, Water supply, Standards, Regulation, Administrative decisions, Water users, Groundwater, Unappropriated water.

Groundwater, Unappropriated water.

Defendant, the holder of a conditional well permit, was ordered by the Colorado Ground Water Commission to cease operation of the well because the permit under which it had been constructed had expired. The expiration occurred because the defendant permit holder had failed to apply the well water to a beneficial use within the time period stipulated in the permit. When the well operator refused to comply with the Commission's order, plaintiff state engineer was granted injunctive relieby a trial court that ordered the well owner to stop using the well. In affirming the Commission's and trial court's decisions, the state supreme court ruled that the appropriator was required to place the water to a beneficial use within the time prescribed by the permit statute; that the statutory time provisions in the designated ground water context did not impremissibly limit the constitutional right to appropriate unappropriated waters; and that the Commission had not acted in an arbitrary or discriminatory fashion when it enforced the time limit, contrary to the defendant's claim that numerous other well permit owners had not had the time limit enforced against their appropriations. (Easterbrook-Florida)

BAUER V. PRESTWICH (USE OF WATER ON LAND MAKES IT APPURTENANT TO THE LAND).

578 P. 2d 1283-86 (Utah 1978).

Descriptors: *Utah, *Water rights, *Spring waters, *Adjacent land owners, Unappropriated water, Springs, Water uses, Water demand, Competing uses, Judicial decisions, Groundwater availability.

uses, Judicial decisions, Groundwater availability. Private landowner brought an action against defendant adjacent landowners seeking to quiet title to waters of a spring on his land and to enjoin defendants from using the spring water. The trial court quieted the title and enjoined defendants from interfering with plaintiffs rights to use the water. Affirming the trial court ruling, the Utah Supreme Court held that the use of water upon a tract of land makes it appurtenant to that land, and, unless the right to the water was separately deeded away, the right to the water would pass with the land. Here, the water from this spring was found to have been used continuously by plaintiff and his predecessors in interest since before 1903—a sufficient period of time to render the right to the water appurtenant to the land and to validate plaintiff's assertion of a 'diligence claim' to the water. A similar 'diligence claim' to the water by defendant was denied because of a lack of proof that the initial use of water prior to 1903 was every conveyed to defendant. Two justices dissented to the decision. (Easterbrook-Florida) W79-02563

YOUGHIOGHENY RIVER-DESIGNATION AS A WILD RIVER; MINING OF MINERALS; RULES GOVERNING USE AND DEVELOP-MENT; FUNDS TO PURCHASE PROPERTY. Md. Code Ann. secs 8-408 thru 8-410 (1974), as amended, (Supp. 1976).

Descriptors: *Maryland, *Legislation, *Wild River Act, *Regulation, Administrative agencies, Planning, State governments, Mining, Zoning, Strip mines, Scenic easements, Wild rivers, Eminent domain, River regulation, Condemnation, Adjacent land owners.

The Youghiogheny River between Millers Run and the city of Friendsville is designated a wild river. Strip mining or open-pit mining is prohibited in this river, except for areas which have already been mined and are not reclaimed. The area designated as scenic shall be confined to adjacent land areas visible from the river or its shore. Development of scenic areas adjacent to the river shall be regulated by the Department of Natural Resources after review by the local advisory board and the Scenic and Wild rivers Review Board. Development includes any structure, addition or alteration placed or constructed on land or water. If any Department rules or statutory prohibitions under the Scenic and Wild River Program result in the taking of a property right without just compensation, the property so taken shall be paid for. Funds from the Program Open Space may be used for this purpose if the acquisition has been previously approved by the General Assembly. (Molloy-Florida)

SHORE EROSION CONTROL. Md. Code Ann. sec 8-1005 (1974), as amended, (Supp 1976).

Descriptors: *Maryland, *Erosion control, *Financing, *Loans, Beach erosion, Legislation, Construction, Land management, Adjacent land owners, Local governments, Diversion structures, Tax rates, Interest, Assessments, State governments, Real property, Property values.

The Shore Erosion Control Construction Loan Fund is created to provide interest-free loans to individuals or local governments for construction of shore erosion structures. The state shall levy a special real estate tax on private property benefited by erosion control projects, and these monies shall be considered repayments of principal on loans from the Fund. This tax shall be levied by agreement between state and property owner for a period not exceeding 25 years, to compensate the state for project construction cost. Annual appropriation of general funds may also be added to the Fund to insure an effective yearly construction program. Approved projects may receive loans for 100 percent of the first \$40,000 of cost, 50 percent of the next \$20,000 and 10 percent of construction costs exceeding \$80,000. If two or more property owners are included within a single project and project construction cost exceed \$80,000, the land of each is considered separately for computing net project construction cost under this formula. (Molloy-Florida)

BOHEMIAN BRETHREN PRESBYTERIAN CHURCH V. GREEK ARCHDIOCESAN CATHEDRAL OF THE HOLY TRINITY (RUNOFF DAMAGE RESULTING FROM GRADING OF ADJOINING PROPERTY).
405 N.Y.S. 2d 926-29 (Sup. Ct. 1978).

Descriptors: *Reasonable use, *Relative rights, *Surface runoff, *New York, Alteration of flow, Natural flow doctrine, Water law, Urban runoff, Rainfall, Storms, Damages.

Plaintiff church sought \$150,000 for damages allegely resulting from surface water runoff flowing from defendant church's property onto plaintiff's adjoining property. Defendant admitted it altered its property, but claimed the improvements were made to fit the property for a reasonable and rational use. Consequently, in a pretrial motion, defendant soughts dismissal of the suit, claiming plaintiff had not stated a cause of action requiring a trial. The New York trial court noted this suit raised the legal question as to the extent to which a land owner may cast off surface water onto the property of his neighbor. Three theories were examined. Under the natural flow theory, the owner of land who interferes with the natural flow of water is liable for damages caused to lower land. Under the common enemy rule, each owner has the absolute right to cast off waters from his land as he sees fit. In finding that the plaintiff had stated

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a valid cause of action, the Court held that the reasonable use theory—under which a landowner who alters the flow of surface waters is liable for injury when his interference is unreasonable—must be applied in New York. (Stump-Florida) W79-02566

IN RE WATER RIGHTS OF THE CIBOLO CREEK WATERSHED (LANDOWNER'S CLAIM OF EQUITABLE RIPARIAN WATER RIGHTS DENIED).

568 S.W. 2d 155-59 (Tex. Ct. App. 1978).

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Descriptors: *Texas, *Water rights, *Riparian rights, *Irrigation practices, Streams, Competing uses, Water users, Water demand, Administrative decisions, Watershed management, Water distribution(Applied), Irrigation water.

The owner of two tracts of land on Cibolo Creek initiated an administrative adjudication of his water rights before the Texas Water Rights Commission. The adjudication was authorized by the state's Water Rights Adjudication Act (Act). One tract, located in Wilson County, was found to have a right to 80-acre feet based upon prescription and equity. The second tract, located in Guadalupe County, was found to have no recognizable water right. After dismissing the landowner's attack on the constitutionality of the Act, the review court held that in the absence of specific grants of irrigation water rights, land acquired under under Spanish and Mexican land grants—as were the two tracts here—do not have appurtenant riparian irrigation rights. The courts also held that the owner of a tract which had been irrigated with water from the creek for many years did not have a vested equitable right to creek water for irrigation. Finally, the court ruled that the state, or its predevested equitable right to creek water for irrigation. Finally, the court ruled that the state, or its predecessor soverighty, is the source of all titles; consequently, there exists a presumption of ownership in favor of the state until a claimant can show a valid grant of water rights out of the soverighty. (Easterbrook-Florida) W79-02567

PETERSON V. GROUND WATER COMMISSION (EVIDENCE OF OVERAPPROPRIATED GROUND WATER RESOURCES SUFFICIENT TO DENY WELL CONSTRUCTION PERMIT APPLICATION).

579 P. 2d 629-35 (Colo. 1978).

Descriptors: *Colorado, *Groundwater resource, *Well permits, *Hydrograph analysis, Groundwater availability, Well data, Water rights, Administrative decisions, Hydrographs, Appropriation, Unappropriated water, Water level fluctuations.

Plaintiff landowner appealed a Colorado Ground Water Commission decision denying him permis-sion to construct a well and to appropriate desig-nated ground water from the Northern High Plains Designated Ground Water Basin. The permit application was denied when the Commission determined that water within a three-mile circle of the mined that water within a three-mile circle of the proposed well site was over appropriated and that the proposed well would unreasonably impair existing water rights. Affirming the denial, the state Supreme Court held that prior appropriators are entitled to protection against unreasonable impairment of their rights under the state's Ground Water Management Act, regardless of their decision to make an objection or not. Although the Court specifically disapproved of certain Commission application processing/permit granting procedures, it concluded that hydrograph interpretation evidence offered by expert witnesses for the Commission was sufficient to conclude that unappropriated water did not exist, and that plaintiff's well mission was sufficient to conclude that unappro-priated water did not exist, and that plaintiff's well would unreasonably impair existing water rights in plaintiff's 'circle.' Even though the Commission's and lower court's use of the disapproved proce-dures was deemed to be erroneous by the Court, the error was not sufficient to reverse the permit application denial. (Easterbrook-Florida) W79-02568

CONCERNED CITIZENS FOR ORDERLY PROGRESS V. COMMONWEALTH OF PENN-SYLVANIA, DEPT. OF ENVIRONMENTAL RESOURCES (SEWAGE FACILITY CONSTRUCTION PERMIT UPHELD),

387 A. 2d 989-95 (Pa. Commw. Ct. 1978).

Descriptors: *Pennsylvania, *Sewage treatment, *Sewers, *Overland flow, Sewage disposal, Water pollution sources, Discharge(Water), Flood flow, Waste water treatment, Administrative decisions,

Plaintiffs, a concerned citizens group, affected land owners and a township, brought this action seeking review of a decision of the defendant Pennsylvania Department of Environmental Resources (DER) to grant a permit authorizing construction and operation of sanitary sewers and a sewage treatment plant. The permit was granted to Emerald Enterprises, Inc. The facilities were to serve an approved development. The Court noted its scope of review of DER decisions mandated that it affirm the DER decision unless appellant's constitutional rights were violated, there was an error of law, or there was insufficient evidence to support a finding of fact. Affirming the DER decision, the court made the following findings: (1) the state's Clean Streams Law mandating consideration of present and possible future use of waters does not prohibit changes in those uses; (2) an administrative review board fending that the stream and bog involved here were natural discharge areas rather than recharge area, with sufficient evidence, compiled with requirements of the Clean Streams Law; (3) there was no error in lack of consideration of potential flooding where the potential was purely speculative. (Stump-Florida)

SPEARS V. BERLE (WETLANDS PROPERTY USE RESTRICTIONS NOT A FAKING WHEN SERVING A PUBLIC PURPOSE). 407 N.Y.S. 2d 590-97 (App. Div. 1978).

Descriptors: *New York, *Wetlands, *Freshwater, *Permits, Legislation, Water law, Legal aspects, Condensation, Water permits, Land use, Environmental control.

Plaintiffs, owners of two parcels of land contaning freshwater wetlands, brought this proceeding seeking review of the denial of their application for a permit to remove humus, sand, and stone from the wetlands. New York's Fresh Water Wetlands Act (Act) requires that a permit be obtained from the Commission of Environmental Conservation in order to carry out virtually any activity on a freshwater wetland. A major question considered here by the Court was whether the use restrictions placed on plaintiffs' lands by the Act constitute a taking. After extensive discussion, the Court concluded that once it is demonstrated the property use restrictions serve some public purpose, the property owner must establish that the resulting hardship deprives him of any reasonable use of the property. Once this is established a 'de facto' taking will be determined to have occurred. If this test is met, the property owner may be entitled to test is met, the property owner may be entitled to compensation pursuant to the statute. However, the burden is on the property owner to show a hardship. In this case, the Court held that plaintiffs had not met this burden. (Stump-Florida) W79-02570

WESTERN WATER LAWS AND IRRIGATION RETURN FLOW,

Resources Administration and Development, Inc., Fort Collins, CO.

For primary bibliographic entry see Field 5G. W79-02575

THE LAW OF THE SEA CONFERENCE AT THE CROSSROADS,

United Nations, New York. Bulgarian Delegation. A. Yankov.

Virginia Journal of International Law, Vol. 18, No. 1, p 31-41, Fall 1977.

Descriptors: *Law of the sea, *United Nations, *International law, *Negotiations, International waters, Jurisdiction, Oceans, Exploration, Exploration, Continental shelf, Natural resources, Resource allocation

The Third United Nations Conference on the Law of the Sea recently published the Informal Composite Negotiating Text. The upcoming Seventh Session may provide substantive compromise solutions to fundamental unresolved problems. There appear to be three common concerns among the delegations: (1) that the success of the Conference is of great importance; (2) that a compromise resolution of the outstanding issues is urgently needed; and (3) that the slow negotiations are being overtaken by unilateral action. The Conference is faced with the problem of reconciling opposing national claims and interests and harmonizing long-term perspectives on a global scale with considerations The Third United Nations Conference on the Law perspectives on a global scale with considerations based on expediency and the geographical positions of individual states. The resolution of this dilemma requires an analytical and pragmatic approach in consideration of existing international realities. A general assessment of the work of the Conference leads to the conclusion that substantial Conterence leads to the conclusion that substantial progress in many areas has been made, but the concentrated negotiating effort needed to resolve the remaining issues should not be underestimated. Among the major unresolved issues, two categories are of critical importance: the regime of the international seabed and the status of the economic zone. (Quarles-Florida) W79-02577

OCEAN AND COASTAL LAW TEACHING MATERIALS VOL. II - COASTAL LAW,

North Carolina State Univ. at Raleigh. Sea Grant Coll. Program.

T. J. Schoenbaum.

Sea Grant Publication UNC-SG-77-09, April, 1977, 363 p, \$5.50. NOAA 04-6-158-44054.

Descriptors: *Coasts, *Water law, *Water poliby, *Legal review, Judicial decisions, Legal aspects, Legislation, Oceans, Law of the sea, Continental shelf, Law enforcement, Evaluation.

This compilation of diverse teaching materials examines the interrelationship between the law of the sea and legal problems associated with the coastal zone. Recognized is the fact that coastal planning decisions will affect how ocean resources are developed, and conversely, that development of ocean resources will impact upon the coastal zone. General topic areas included in this volume are public and private rights in coastal areas, and comprehensive coastal planning law. More specific areas covered include: (1) the public trust doctrine, which maintains that lands under navigable waters are held in trust by the government for use by the public; (2) shoreline changes; (3) public access to are held in trust by the government for use by the public; (2) shoreline changes; (3) public access to beaches; (4) conservation and development of public lands; (5) the regulatory and civil works activities of the U.S. Army Corps of Engineers, including consideration of the Federal Rivers and Harbors and Water Pollution Control Acts; (6) state regulatory activities; (7) the Federal Coastal Zone Management Act and similar state laws; (8) implementation of coastal planning; (9) and constitutional issues related to the coastal zone. These topics are covered through consideration of judicial decisions, statutes, and textual notes. (Malefatto-Florida) fatto-Florida) W79-02578

NEPA'S EFFECT ON THE CONSIDERATION OF ALTERNATIVES: A CRUCIAL TEST, Stanford Univ., CA. Dept. of Civil Engineering. For primary bibliographic entry see Field 5G. W79-02607

A PROGRAM TO PROMOTE IRRIGATION CONSERVATION IN IDAHO, Idaho Dept. of Water Resources, Boise.

For primary bibliographic entry see Field 3F.

Field 6-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

INTERIM REPORT OF THE GOVERNOR'S TASK FORCE ON WATER RESOURCES.

Kansas Water Resources Board, Topeka For primary bibliographic entry see Field 6D. W79-02700

ECONOMIC INCENTIVES FOR INSTITUTIONAL CHANGE: THE CASE OF THE VIRGINIA WETLANDS ACT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economies.
R. R. Carriker.

PhD Dissertation November 1976 145 n

Descriptors: *Wetlands, *Virginia, *Legislation, *Economic justification, Marshes, Land use, Economic feasibility, Economics, Decision making, Natural resources, Water demand, Marsh management Market value

The case of the Virginia Wetlands Act is presented as a problem setting within which to explore the view that protection of ecologically productive wetlands was associated with increases in demand for those goods, services, and activities dependent in some way on the ecological services of wetlands. A case study approach was used to examine the influence on residential land prices achieved by filling or draining saltmarshland. The market value of land is defined within the context of economic theory of rent. A land value comparison technique. theory of rent. A land value comparison technique was used to identify market price differentials at-tributable to waterfront amenities of marshlands as tributable to waterfront amenities of marshlands as residential sites. Changes in this differential over time are taken as a measure of the time rate of increase in social benefits attributed to development uses of marshes. Using estimates generated by other studies of parameters for the demand for sport fisheries, and time series observations on variables which influence demand for sport fishing in the Chesapeake Bay, estimates were made of the in the Chesapeake Day, estimates were made of the time rate of change in social benefits attributable to ecological productivity of undeveloped wetlands. Other sources of value for undisturbed wetlands were also noted. (Steiner-Mass) W79-02721

COLORADO RIVER DEVELOPMENT, (COLO-RADO RIVER BASIN),

Upper Colorado River Commission, Salt Lake City, UT. I. V. Goslin.

In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 18-60. University of Arizona Press, Tucson, 1978. 4 fig. 1 tab, 7 ref.

Descriptors: *Colorado River Basin, *Colorado River, *History, *Legislation, *Legal aspects, Regional analysis, River basins, Water law, Water management(Applied).

This outline of the history of the development of the Colorado River offers a broad look backward at the influences that had led to present conditions, as well as a base from which to analyze the conse-quencs and relative values of alternative choices relating to the future. Events covered include early exploration/navigation, early irrigated agriculture, exploration/navigation, early irrigated agriculture, modern irrigation (including the Salt River Project, Arizona; Strawberry Valley Project, Utah; and the Imperial Valley, California), the need for water storage reservoirs, and the 1922 Fall-Davis report. A detailed description of the evolution of the 'law of the river' follows, including the Colorado River Compact, the Boulder Canyon Project Act, the Mexican Water Treaty, the Upper Colorado River Basin Compact, the Colorado River Storage Project Act, the Fryingpan-Arkansas Project age Project Act, the Fryingpan-Arkansas Project Act, the Colorado River Basin Project Act, the Act, the Colorado River Basin Project Act, the Water Resources Planning act, the National Water Commission Act, the National Environmental Policy Act, and the Federal Water Pollution Control Act, together with a summary of the myriad legal problems deriving from this incredibly complex historical sequence of legislation. He concludes with a brief discussion of new regional trends in which he reminds us that accuse the moderate with the concept of augmenting the limited series of the river system, future water development. opment in the basin will depend upon sophisticated intensive management whose goal will be the best conservation and use of water for the greater economic and social values...' (See also W79-02732). (Paylore-Arizona).

POLITICS OF WATER ALLOCATION, (COLORADO RIVER BASIN), Arizona Univ. Tucson

H. Ingram.

In: Values and Choices in the Development of the Colorado River Basin, ed. by D. F. Peterson and A. B. Crawford, p 61-75. University of Arizona Press, 1978. 17 ref.

Descriptors: *Colorado River Basin, *Federal government, *Cost analysis, *River basins, Decision making, Political aspects, Evaluation, State gov-

This author maintains that Federal domination of decisions on water allocation has imposed costs upon the Colorado River Basin in terms of the upon the Colorado River Basin in terms of the quality of the decision making process and the reationality of water policy. Her arguments are based on consideration of costs to the Basin of Federal water development: e.g. limitations of choice imposed on regional equity and by Federal initiatives; the bias of choice introducted by Federalinitiatives; initiatives; the bias of choice introducted by Federal evaluation; information affected by Federal at a constant and a constant and a constant and a constant and a constant a c posed resources projects can be evaluated in light of the kind of future the Colorado River Basin envisions for itself. (See also W79-02732). (Paylore-Arizona) W79-02735

POLICY GOALS AND VALUES IN HISTORI-CAL PERSPECTIVE, (COLORADO RIVER BASIN),

Colorado State Univ., Ft. Collins. For primary bibliographic entry see Field 6B. W79-02736

PUEBLO WATER RIGHTS ON THE UPPER RIO GRANDE

New Mexico State Univ., University Park. Dept.

of Civil Engineering. W. J. Balch, and J. W. Clark.

W. J. Balch, and J. W. Clark.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-291 392,
Price codes: A05 in paper copy, A01 in microfiche.
New Mexico Water Resources Research Institute,
Report No. 098 Technical Completion Report,
1978, 86p, 3 fig, 4 tab, 50 ref. OWRT B-055NMEX(1), 14-34-0001-7125.

Descriptors: *Pueblo Indians Water Rights, *Water rights, Water utilization, Irrigation, Water allocation, Prior appropriation, Surface water, Groundwater, *New Mexico, *Rio Grande River(NM), Indian water rights, Indian reservations, *Winter's doctrine, Tesuque Pueblo(NM), Pojaque Drainage Basin(NM), Santa Fe County(NM).

This study concerns the water rights of the Pueblo Indians on the Upper Rio Grande using the Tesuque Pueblo as a case study. The Tesuque Pueflo is one of four Indian pueblos involved in a legal dispute over the water rights of the Pojaque Drainage Basin, located in Santa Fe County, New Mexico. A genral backround affecting this dispute

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is presented which includes the general legal status of Indian water rights in the United States at the present time and the past usage of water by the Pueblo Indians. The Tesuque Pueblo's case is disucssed with respect to this background, the possible allocation of water rights between the Tesuque Pueblo and their non-Indian neighbors, and the effect of utilizatin of these water rights on the mediate hydrologial system. (Stockton-New W79-02818

INSTITUTIONAL ARRANGEMENTS FOR AREA-WIDE QUALITY PLANNING AND MANAGEMENT, SECTION 208 APPLIED IN THREE METROPOLITAN AREAS OF THE GREAT LAKES,

Michigan Univ., Ann Arbor. Dept. of Civil Engi-For primary bibliographic entry see Field 5G. W79-02819

ISSUES, INTERESTS AND POWER: ENVIRON-MENTAL POLITICS IN THE COMMUNITY SETTING,

Delaware Univ., Newark. For primary bibliographic entry see Field 6B. W79-02825

SOCIAL IMPACTS FROM WILDLIFE WITHIN THE COLUMBIA BASIN IRRIGATION DIS-TRICT

Washington State Univ., Pullman. Dept. of Forest and Range Management.
For primary bibliographic entry see Field 6B.

WATER RESOURCES RESEARCH SUPPORT PROGRAM 1978-1979.

Department of Fisheries and Environment, Ottawa (Ontario). Inland Waters Directorate. 1978, 20 p., Text in English and French.

Descriptors: *Investigations, *Water resources, *Universities, Model studies, Econometries, Social aspects, Water pollution control, Sediments, Hydrology, Subsurface waters, Contamination(Water), Snow, Ice, Permafrost, *Canada, *Alphabetical listing, *Institutional as-

The Department of the Environment, on the recommendation of the Water Resources Research Support Program Review Group, has agreed to provide a total of \$1,000,000 for water-related environmental research during 1978 to 1979 to 24 Canadian universities. The Water Resources Research Support Program provides for innovative research relevant to Departmental concerns and responsibilities for water resources research in the responsibilities for water resources research in the natural and social sciences with emphasis on water natural and social sciences with emphasis on water management issues. By fostering the interest of university researchers, it thereby utilizes their knowledge and expertise in solving water research problems, and provides opportunities for their par-ticipation in socially relevant environmental re-search. The concerns and responsibilities of the Inland Waters Directorate include a comprehen-sive research program with which the Water Re-sources Research Support Process is interested. sive research program with which the Water Resources Research Support Program is integrated. Some of the current priorities of this research agreement program with universities are: Economic, social and institutional aspects; water and sediment quality aspects; hydrologic modelling; subsurface contamination; hydraulies of water systems; snow and ice; resources data. (WATDOC) W70.028 W79-02928

6F. Nonstructural Alternatives

NEPA'S EFFECT ON THE CONSIDERATION OF ALTERNATIVES: A CRUCIAL TEST, Stanford Univ., CA. Dept. of Civil Engineering. For primary bibliographic entry see Field \$0. W79-02607

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Ecologic Impact Of Water Development—Group 6G

CONTROL OF 1973 MISSISSIPPI RIVER

Army Engineer District, Vicksburg, MS. For primary bibliographic entry see Field 4A. W79-02717

AN ECONOMIC ANALYSIS OF ALTERNA-TIVE FEDERAL FLOOD DAMAGE ASSIST-ANCE PROGRAMS.

Cornell Univ., Ithaca, NY.

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Cornell Univ., Irinaca, N.1.

M. J. Rettger.

Available from the National Technical Information Service, Springfield, VA 22161, as PB-291 341, Price codes: A11 in paper copy, A01 in microfiche.

MS Thesis August 1977. 222 p, 18 fig, 38 tab.

OWRT A-074-NY(1), 14-34-0001-7068.

Descriptors: *Flood damage, Programs, *Simulation analysis, *Cost analysis, Evaluation, Costs, Benefits, Mathematical models, Systems analysis, *Risks, Flood control, Model studies, *Alternative costs, *New York, Non-structural alternatives, Binghamton(NY), *Flood insurance programs.

An economic analysis of alternative flood relief programs is presented, based on the simulated flooding experience of the Binghamton (N.Y.) metropolitan area. The theory of consumer choice under conditions of uncertainty is used to develop evaluation criteria for flood insurance and disaster loan programs based on the benefits and costs of loan programs based on the benefits and costs of each program to both the public and the private sectors. A simulatin model is then designed to provide data for empirical implementation of the program analysis. The flood relief simulator is applied to a variety of possible assistance programs, including the national Flood Insurance program and the Small Business Administration disaster loan program. Model results suggest that program designs cause substantial variations in costs, not only in terms of total outlay, but also in the distribution of costs between the government and individuals. In general, the actuarial flood insurance program is a preferred choice based on total program costs. None of the programs studied have significant incentives on the relocation of flood-prone properties away from areas of high flood hazard. W79-02824

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL IMPACT ASSESSMENT. Lyndon B. Johnson School of Public Affairs, Austin, TX. Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 268. Price codes: A12 in paper copy, A01 in microfiche.

Descriptors: *Computer models, *Environmental engineering, *Planning, *Systems analysis, *Water resources development, Administrative agencies, Computers, City planning, Electric power, Environment, Environmental control, Federal government, Land use, Legal aspects, Mathematical models, Surveys, Waste disposal, Water law.

The ways in which environmental impact statements are prepared crucially depend upon the analysts' ideas of why the statement is being prepared, what purposes it is intended to serve, and what audiences it is intended to reach. One possible purpose of the impact statement is simply to comply with the letter of the law requiring that it be prepared. An impact statement complies if it includes the five points listed in the law: impacts of the action, unavoidable adverse effects, alternatives that had been considered and rejecteficits and offs between long-term and short-term effects and offs between long-term and short-term effects and irreversible commitments of resources. Other posirreversible commitments of resources. Other possible purposes of environmental impact statements are: to provide full disclosure of all significant effects of a proposed action on the quality of the human environment, to communicate information about environmental effects to audience outside the agency, and to improve the analysis and comparison of alternative proposals. Unfortunately, the statement itself has remained largely a legal docu-

ment, whose content too often fails to contribute effectively to the process of selecting among alternative major actions. (Jordan-Florida) W79-02524

ENVIRONMENTAL ASSESSMENT - ALTER-NATIVES OF GENERAL MANAGEMENT PLAN AND WILDERNESS STUDY FOR CAPE LOOKOUT NATIONAL SEASHORE, NORTH

National Park Service, Denver, CO. Denver Serv-Feb. 1978, 134 p., App.

Descriptors: *North Carolina, *Alternative planning, *National seashores, *Management, Legisland, Recreation, Public access, Parks, Environmental effects, Barrier islands, Freshwaier, Com-

A general management plan is necessary for the preservation of North Carolina's Cape Lookout National seashore's natural values as well as to Provide public access for the use and enjoyment of the area. A wilderness study is necessary to consid-er wilderness preservation of suitable areas along the seashore. This document attempts to analyze: the seashore. This document attempts to analyze: critical resources and suggest alternatives visitor use and development strategies; and wilderness proposals for the area. From the various comments and components of the alternatives received during review of the document, a general management plan and a wilderness study will be formulated. As plan and a wilderness study will be formulated. As an initial step in developing a plan, a statement of management was prepared and made available for public review. The most frequently mentioned responses are listed. The legislative background concerning the area is explained. The legislative mandate, agreements, and regulations that guide planning for the area are set forth. Available resource information and ongoing studies relating to the area are explained. The area environment is described in detail. Five alternative's are set forth in detail, along with each alternative's projected impacts and adverse effects and mitigating measures. (Quaries-Florida) (Quaries-Florida) W79-02525

ENVIRONMENTAL REGULATION OF UNITED STATES DEEP SEABED MINING, Marshall-Wythe School of Law, Williamsburg,

For primary bibliographic entry see Field 6E. W79-02548

PROTECTING THE CALIFORNIA COAST. For primary bibliographic entry see Field 6E. W79-02554

APPLICATION OF FIVE METHODS FOR MEASUREMENT OF WILDLIFE VAUE; LOWER SHEYENNE RIVER BASIN, NORTH DAKOTA, North Dakota State Univ., Fargo. Dept. of Agri-

For primary bibliographic entry see Field 2I. W79-02605 cultural Economics.

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF, INTERIM SYNTHESIS: BEAUFORT/CHUKCHI,

National Oceanic and Atmospheric Administra-tion, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 5C.
W79-02608

SPECIES, HABITATS AND PROCESSES SEN-SITIVE TO OCS DEVELOPMENT, Environmental Research Lab., Fairbank, AK. Arctic Project Office.

For primary bibliographic entry see Field 5C. W79-02609

TROPHIC INTERACTIONS.

Environmental Research Lab., Fairbanks, AK. Arctic Project Office. For primary bibliographic entry see Field 5C. W79-02610

PROBABLE IMPACTS AND CONSEQUENCES OF OIL DEVELOPMENT, Environmental Research Lab., Fairbanks, AK. Arctic Project Office.

For primary bibliographic entry see Field 5C. W79-02611

EFFECTS OF GRAVEL MINING AND CONSTRUCTION OF GRAVEL ISLANDS AND CAUSEWAYS.

Environmental Research Lab., Fairbanks, AK. Arctic Project Office. For primary bibliographic entry see Field 5C. W79-02612

ENVIRONMENTAL HAZARDS TO OFF-SHORE OPERATIONS. Environmental Research Lab., Fairbanks, AK. Arctic Project Office. For primary bibliographic entry see Field 5C. W79-02613

ECOLOGICAL EFFECTS OF AN ARTIFICIAL ISLAND, RINCON ISLAND PUNTA GORDA, CALIFORNIA,

Dames and Moore, Los Angeles, CA.

Dames and Moore, Los Angeles, CA.
G. F. Johnson, and L. A. deWit.
Army Coastal Engineering Research Center Miscellaneous Report No. MR-78-3, September 1978.
108 p, 21 fig, 4 tab, 20 ref, 7 append. DACW 72-76-C-0011.

Descriptors: *Ecology, *Offshore platforms, *Environmental effects, *Water quality, Resources development, Biota, Water resources, California, Oil wells, *Outer Continental Shelf, *Artificial Islands, Ecological effects.

Marine ecological conditions at Rincon Island, located approximately 0.8 kilometer offshore between Ventura and Santa Barbara, California, in a depth of 14 meters are documented. The island, which was constructed between 1957 and 1958 to serve as a permanent platform for oil and gas production, is particularly suitable for ecological study. Habitat features associated with the armor rock and concrete tetrapods surrounding the island support a 'microecosystem' which differs in biotic support a 'microecosystem' which differs in biotic composition from surrounding natural bottom areas. A major part of the study is devoted to analysis of seasonal dynamics in biotic composition. Data analysis indicates that many species exhibit significant variability in abundance from one season to the next. Other studies include a gill net survey of fish fauna, mapping of mussel 'talus' beds at the base of the island, and a survey of biota along a natural bottom transect between the island along a natural bottom transect between the island and shore. In general, the findings indicate a rich and varied fauna and flora associated with the high-relief solid substrate of Rincon Island which differs substantially from the more depauperate natural bottom habitats in the area. (Sinha-OEIS) W79-02614

VULNERABILITY OF COASTAL ENVIRON-MENTS TO OIL SPILL IMPACTS,

South Carolina Univ., Columbia. For primary bibliographic entry see Field 5G. W79-02616

AN OILSPILL RISK ANALYSIS FOR THE MID-ATLANTIC (PROPOSED SALE 49) OUTER CONTINENTAL SHELF LEASE AREA, Geological Survey, Reston, VA. Water Resources

For primary bibliographic entry see Field 5G. W79-02661

Field 6-WATER RESOURCES PLANNING

Group 6G-Ecologic Impact Of Water Development

THE EFFECT OF HYPOLIMNION RESERVOIR RELEASES ON FISH DISTRIBUTION AND SPECIES DIVERSITY,
Texas Univ. at Austin. Dept. of Zoology.

R. J. Edwards.

Transactions of the American Fisheries Society, Vol. 107, No. 1, p. 71-77, 1978.

Descriptors: *Dams, *Fish populations, Fish physiology, Cold resistance, Hypolimnion, *Reservoirs, *Thermal stratification, Trophic level, Productivity, Impounded water, Impoundments, Sunfishes, Catishes, Biological communities, Ecosystems,

The fish faunas above and below Canyon Reservoir, Comal County, Texas, were surveyed to determine the effect of the impoundment upon the downstream community. Although 22 species were found above the reservoir, only 18 species were taken in the area downstream from the dam. Comtaken in the area downstream from the dam. Com-parisons with pre-impoundment surveys of this area, taken a quarter century ago, indicate that seven species, which were once present in the downstream area, are now absent. Species diversidownstream area, are now absent. Species diversity indices demonstrate reduced diversity below the impoundment. Changes in downstream water quality, especially water temperature, due to hypolimion water releases, seem to be the most likely causal factors associated with this disruption of the natural stream community. (Deal-EIS)

ASSESSMENT AND IMPLEMENTATION OF IN-STREAM VALUE STUDIES FOR THE NORTHERN GREAT PLAINS,

Montana Univ., Missoula. Dept. of Geology. For primary bibliographic entry see Field 4A. W79-02709

NON-POINT SOURCE WATER QUALITY MONITORING, INYO NATIONAL FOREST.

California Univ., Los Angeles. Environmental Sci-For primary bibliographic entry see Field 5A. W79-02718

A CONCEPTUAL ECOLOGICAL MODEL FOR

CHESAPEAKE BAY,
For primary bibliographic entry see Field 2L. W79-02746

DEVELOPMENTAL AND ENVIRONMENTAL HISTORY OF THE DISMAL SWAMP, Indiana Univ. at Bloomington. Dept. of Botany. For primary bibliographic entry see Field 2H.

ECOSYSTEMS OF THE WORLD 1: WET COASTAL ECOSYSTEMS.

For primary bibliographic entry see Field 2L.

PLANT AND ANIMAL COMMUNITIES OF PACIFIC NORTH AMERICAN SALT MARSHES.

California Univ., Santa Barbara. Dept. of Geologi-For primary bibliographic entry see Field 2L. W79-02770

OUTLINES OF ECOLOGY, BOTANY AND FORESTRY OF THE MANGALS OF THE INDIAN SUBCONTINENT,

Centre National de la Recherche Scientifique, Toulouse (France). Inst. de la Carte Internationale du Tapis Vegetal.

For primary bibliographic entry see Field 2L. W79-02774

WET COASTAL FORMATIONS OF INDO-MA-LESIA AND PAPUA-NEW GUINEA, Auckland Univ. (New Zealand), Dept. of Botany. For primary bibliographic entry see Field 2L. W79-02775

EXPLOITATION OF MANGAL, Environmental Research Lab., Gulf Breeze, FL. For primary bibliographic entry see Field 2L. W79-02778

HUMAN USES OF SALT MARSHES, Maryland Univ., College Park. Chesapeake Research Lab. For primary bibliographic entry see Field 2L. W79-02779

ENVIRONMENTAL STUDIES OF KACHEMAK BAY AND LOWER COOK INLET, VOLUME VI: FOOD HABITS OF SHRIMP IN KACHE-MAK BAY, ALASKA, Rutgers - The State Univ., NJ. Dept. of Botany. For primary bibliographic entry see Field 2L.

W79-02780

PROBABILISTIC ANALYSIS OF WATER AVAILABILITY IN POWER PLANT SITE SELECTION.

Arizona Univ., Tucson, Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 3E. W79-02834

SYSTEMATIC ASSESSMENT OF UNCERTAINTIES IN AN ENVIRONMENT IMPACT STATEMENT,

Arizona Univ., Tucson. Dept. of Hydrology and Water Resource

Water Resources. S. Nnaji, D. R. Davis, and L. Duckstein. In: Hydrology and Water Resources in Arizona and the Southwest. Proceedings of the 1976 Meetings of American Water Resources Assn. and Arizona Academy of Sciences, Tucson, Arizona, April 1976, p 29-35 (1976). OWRT B-043-ARIZ(9), 14-31-0001-5056.

Descriptors: Forecasting, *Risks, *Evaluation, Reliability evaluation, Systems approach, Colorado River, Salinity Project, *Environmental Impact

An environmental impact statement (EIS) is meant to be a predictor of the consequences of actions on the environment. However, uncertainties in the statements make it difficult to determine the reliability of the predictions and thus the consequences of the actions. Hence, use of an EIS could be counter-productive if the inherent uncertainties are not recognized and considered in its evaluation. Examination of several EIS's from a systems viewpoint is used to expose the following sources of uncertainty: (1) the identification of the components of the system, (2) the natural uncertainty of the inputs to the system and of the transformation the inputs to the system and of the transformation functions producing the output, (3) uncertainties in the modeling of the system due to limitations of sample, economic and technological data. The above viewpoint is used to analyze the Colorado River Salinity Control Project EIS. Uncertainties are identified and classified and means for assessing and incorporating their effect on the environmental impact assessment are discussed. W79-02882

PRODUCTIVITY OF OSPREYS IN CONNECTI-CUT-LONG ISLAND INCREASES AS DDE RESIDUE DECLINES,

Cornell Univ. Ithaca, NY. Section of Ecology and Systematics. or primary bibliographic entry see Field 5C. W79-02886

MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS,

Fish and Wildlife Service, Washington, DC.
For primary bibliographic entry see Field 5G.

7 RESOURCES DATA

7B. Data Acquisition

TECHNIQUES FOR SAMPLING AND ANALYZING THE MARINE MACROBENTHOS. Corvallis Environmental Research Lab., OR. For primary bibliographic entry see Field 5A. W79-02627

REMOTE SENSING OF SURFACE SOIL MOIS-

National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.

T. Schmugge.

Journal of Applied Meteorology, Vol. 17, No. 10, p 1549-1557. October 1978. 10 fig, 16 ref.

Descriptors: *Remote sensing, *Soil moisture, *Soil surfaces, Temperature, Thermal radiation, Radar, Microwaves, Diurnal distribution, Evaporation, Soil types, Drying, Aircraft, Correlation analysis, Dielectric properties, Skylab.

The unique thermal and dielectric properties of water afford two possibilities for remotely sensing the moisture content in the surface layer of the soil. Observations of the diurnal range of surface temperature, the microwave brightness temperature (emissivity) and radar backscatter of the soil have shown correlations of up to 0.9 with the moisture in the surface layer (approximately 5 cm thick). The microwave techniques appear to maintain their sensitivity to moisture variations in the presence of a crop canopy. Observations of microwave brightness temperature from scalality plat. wave brightness temperature from satellite plat-forms have qualitatively confirmed this sensitivity for a wide range of conditions. (Visocky-ISWS) W79-02682

SATELLITE OBSERVATIONS OF CALCIUM CARBONATE PRECIPITATIONS IN THE GREAT LAKES,

National Environmental Satellite Service, Washington, DC.

A. E. Strong, and B. J. Eadie.

Limnology and Oceanography, Vol. 23, No. 5, p 877-887, September 1978. 9 fig, 3 tab, 17 ref.

Descriptors: *Remote sensing, *Calcium carbonate, *Great Lakes, Satellites(Artificial), Chemical precipitation, Chemicals, Circulation, Water circulation, Lakes, On-site data collections, Sampling, Data processing, Photography, Limnology, *Whitiers*

Reflectance patterns apparently from calcium car-bonate (CaCO3) precipitation have been mapped in bonate (CaCÖ3) precipitation have been mapped in the Great Lakes using satellite multispectral imagery. The milky water phenomenon ('whiting') occurred regularly in summer and fall during the period studied, 1972-1975, in Lakes Ontario, Erie, and Michigan, but not in Superior and Huron. In situ data provide nearly irrefutable evidence that these whitings are calcareous. They are attributed to supersaturation of CaCO3 during periods of thermal stratification and are most intense in the warmer areas of the lakes. The whitings are maximal several meters below the surface and are undeably significant with respect to light transmismai several meters below the surface and are undoubtly significant with respect to light transmission, affecting the euphotic zone and thereby photosynthetic production. The whitings may serve as lakewide markers in synoptic analysis of large-scale epilimnial horizontal motions. (Sims-ISWS) W79-02685

COASTAL WETLANDS: ROLE OF REMOTE SENSING,

Geological Survey, Reston, VA. V. C. Carter.

In: Proceedings of the Symposium on Technical, Environmental, Socioeconomic, and Regulatory Aspects of Coastal Zone Management, American Society of Coastal Engineers, San Francisco, p 1261-1283, March 14-16, 1978. 1 fig. 1 tab, 59 ref.

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Evaluation, Processing and Publication—Group 7C

Descriptors: *Wetlands, *Mapping, *Remote sensing, Census, Surveys, Coastal marshes, Aerial photography, Marsh management.

An overview is presented of the applications of remotely-sensed data to coastal wetlands. In part, technical problems are related to definition and classification; scale, formats, and boundaries, evaluations, mapping methodology, and overlapping responsibility of agencies. Today's operational inventories in coastal states are built on the past decade of research and technology development in ventories in coastal states are built on the past decade of research and technology development in remote sensing of wetlands. These inventories and map products utilize aerial photographs as a basic data source and differ in scale, format, minimum mapping unit, classification system, and purpose. The Fish and Wildlife Service is conducting a new national inventory of wetlands which is intended to provide a standardized basis for comparison of wetlands. It too will use available aerial photographs as a basic data source. In the future, satellite data may provide an accurate, reliable, and economical source to update wetland inventories and to monitor or evaluate coastal wetlands. The imnomical source to update wetland inventories and to monitor or evaluate coastal wetlands. The improvement in technology accompanying the development and launch of LANDSAT C and D and the Space Shuttle promise to make satellite digital data a more powerful tool to supply future management weeds for coastal wetlands. (Steiner-Mass) W79-02747

APPLICATIONS OF REMOTELY SENSED DATA TO WETLAND STUDIES.

Geological Survey, Reston, VA.

COSPAR: Space Research Volume XVII. Rycroft, J. J., and Strickland, A. C. (eds.), p 19-23, 1977. 11 ref.

Descriptors: *Wetlands, *Remote sensing. *Mapping, Marsh plants, Aerial photography, Censuses, Satellites, Salt marshes, Fresh water marshes, Distribution patterns.

Remotely sensed data from both aircraft and satellite platforms have been used for a variety of wetland studies. For example, identification of major vegetative associations with LANDSAT digital data made it possible to estimate primary productivity in a Virginia salt marsh. Both seasonal color infrared photographs and LANDSAT digital data are being used for inland wetland investigations. In co-operation with the Tennessee Valley Authority, wetlands in western Tennessee are being classified and mapped at 1:24,000 scale using color infrared photographs which show both boundary dynamics an vegetation. The U.S. Geological Survey and the U.S. Fish and Wildlife Service are using color infrared photographs to aid in a hydrologic study and to map vegetation at 1:24,000 and 1:100,000 scales in the Great Dismal Swamp of Virginia and North Carolina. In each case the base maps are being used to evaluate the accuracy of LANDSAT analyses with the objective of using LANDSAT data for monitoring vegetative change and for updating maps. (Steiner-Mass)
W79-02749 Remotely sensed data from both aircraft and satel-W79-02749

A NEW METHOD FOR COLLECTING WATER SAMPLES FROM BENEATH THE ICE,

Queen's Univ., Kingston (Ontario). Dept. of Geo-Queen's Cinix., Kingston (Cintario). Dept. of Geological Sciences.

R. J. Patterson, L. Dykes, S. Frape, R. A.
McLeod, and J. Wickens.
Limnology and Oceanography, Vol. 23, No. 5, p. 1029, September 1978. 3 ref.

Descriptors: *Sampling, *Water sampling, *Lakes, *Ice, Equipment, Methodology, On-site investigations, Data collections, Limnology, Samplers, Subice water samplers.

A subice sampler was made of a length of tubing which can be tightly sealed at one end by means of a clamp. It was placed open end down through a hole in the ice, pressurized and sealed to maintain the water level below the ice base so that water inside will not freeze, and allowed to freeze in

place. Water samples from beneath the ice were collected by releasing the pressure in the tube and withdrawing water with a small hand-operated pump. (Sims-ISWS) W79-02845

SOLAR MIDDLE ULTRAVIOLET (UV-B) MEA-SUREMENT IN COASTAL WATERS RICH IN VELLOW SUBSTANCE,

Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.

For primary bibliographic entry see Field 2L.

DEW-MONITORING NETWORK IN THE SOUTHEAST.

National Weather Service, Auburn, AL. Environental Studies Service Center

Bulletin of the American Meteorological Society, Vol. 59, No. 9, p 1150-1154, September 1978. 4 fig. 1 tab 6 ref

Descriptors: *Dew, *Monitoring, *Alabama, *Georgia, *Florida, *Southeast U.S., Foods, Fibers(Plant), Plant diseases, Diseases, Climatology, Insects, *Dew-monitoring network, Crop harvesting, Duvdevani dew gage, Davis-Hughes wet-

A network for monitoring dew in the humid climate of southeasten United States was described. Dew is an important factor in the production of food and fiber and plays a role in the development and spread of many plant diseases, in the activity of insects, and in the application of pesticides. The harvest of major crops in Alabama, Georgia, and Florida, such as peanuts, cotton, and citrus, also are affected by dew. Data were collected from the network each day for use in agricultural weather advisories. Later analysis of the data as recorded on strip charts provided additional detailed information. The design of the instrument system allows for an excellent response to a range of wetness matton. The design of the instrument system allows for an excellent response to a range of wetness intensities. Nearly all the network stations used a standard bush for the sensor exposure, with the sensors deployed in a similar manner in and near the bush. All dew data were summarized by month and season. (Roberts-ISWS)

W79-02853

THE CALIBRATION OF A PHYTOPLANKTON GROWTH MODEL USING BATCH CULTURE

Virginia Univ., Charlottesville. Dept. of Environmental Sciences

For primary bibliographic entry see Field 5C. W79-02878

UN NOUVEL ASPIRATEUR SOUS-MARINS A AIR COMPRIME (A NEW SUBMARINE SUC-TION-SAMPLER, USING COMPRESSED AIR), Centre d'Oceanographie, Marseille (France). Sta-tion Marine d'Endoume.

Marine Biology, Vol. 43, p 379-380, 1977. 1 fig, 2 ref. (In French with English abstract).

Descriptors: *Research and development, *Sampling, *Design, *Research equipment, Technology, Benthos, Instrumentation, Testing, Equipment, Construction equipment, Methodology, Annual populations.

An automatic submarine auction apparatus for qualitative benthos sampling was described. The sampler was described as being easy to handle. sampier was affected by means of compressed air from cuba diving bottles and was regulated from the surface. Water inlets in the form of 5 small tubes were used to counterbalance the suction effect. 15 kg of lead was used as ballast for the sampler. (EIS-Klein) W79-02897 AN INEXPENSIVE AND EASILY FABRICAT-ED SAMPLER FOR COLECTING SEDIMENT CORES TO MEASURE EH POTENTIALS, University of West Floida, pensacola. Faculty of

Biology. G. A. Moshiri, D. P. Brown, and W. G.

Floirda Scientist, Vol. 40, No. 2, p 203-205, 1977.

Descriptors: *Sediments, Estuaries, Sampling, Measurement, *Oxidation-reduction potentia

Collection of single or multiple cores for the purpose of measuring mud and/or water Eh potentials in estuarine sediments similar to those encountered in northwest Florida estuaries is simplified by new modifications to core design to reduce fabrication costs and facilitate collection and analysis of samples. (Morgan-Florida) W79-02917

TECHNIQUE FOR COLLECTING FISH WITH A BLOCK NET IN A PUMPED STORAGE RES-

Radiation Management Corp., Drumore, PA. Muddy Run Ecological Lab. P. G. Heisey.

The Progressive Fish Culturist, Vol. 40(4), p 155-157, Oct. 1978, 1 tab. 1 ref.

Descriptors: *Freshwater fish, *Fishing, Fishing gears, Pennsylvania, Nets, On-site investigation, *Methodology, *Block nets, *Susquehanna River, Muddy Run Pumped Storage Pond, Fish harvest, *Fish populations, Ecological distribution, Population composition, Ponds.

A method was developed to sample fish in the Muddy Run Pumped Storage Pond which is located along the Susquehanna River in Southeastern Pennsylvania. More species of fish as well as more individuals were taken more consistently with a block net than with any other gear. (EIS-Katz) W79-02976

INEXPENSIVE CONSTANT WATER LEVEL DEVICE FOR FLOW-THROUGH AOUAR-

Mississippi State Univ., Mississippi State. Dept. of Biochemistry.

D. L. Garling, Jr., and R. P. Wilson.
The Progressive Fish-Culturist, Vol. 38, No. 1, p 52-53, 1976, 2 fig.

Descriptors: *Design, *Laboratory tests, Research and development, Design criteria, Evaluation, Specifications, Design data, Aquaria, Laboratory equipment, Bioassay, Aquiculture, *Methodology, *Constant water level device, *Flow-through

An inexpensive device for maintaining constant water levels in flow-through aquariums, designed and built for use in fish laboratories, was described. The constant-level device consisted of a siphon that emptied water into a reservoir which had a side arm near the top for final water removal to the appropriate drain. The dimensions, materials, and costs of construction were given. (Katz).

7C. Evaluation. Processing and Publication

INTRODUCTION TO THE MODEL STATE INFORMATION SYSTEM (MSIS). American Management Systems, Inc., Arlington, VA.

For primary bibliographic entry see Field 5G. W79-02520

THE DEVELOPMENT OF FLOOD-POTENTIAL INDEX MAPS FOR PENNSYLVANIA, Pennsylvania State Univ., University Park. Dept. of Civil Engineering. For primary bibliographic entry see Field 4A. W79-02598

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Group 7C-Evaluation, Processing and Publication

ANALYSIS OF GRAVITY DATA FROM THE PICACHO BASIN, PINAL COUNTY, ARIZONA

Arizna Univ., Tucson. Dept. of Geosciences.

F. J. Christie.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-290 139, Price codes: A09 in paper copy, A01 in microfiche. M.S. Thesis, 1978. 105 p. 35 fig. 2 tab, 67 ref. OWRT A-073-ARIZ(1), 14-34-0001-8003.

Descriptors: Groundwate, Geophysics, Subsidence, Data collections, Data analysis, *Gravity surveys, Model studies, *Arizna, Picaho Basin area(Ariz)

A gravity survey was conducted in the Picacho Basin area, located approximately midway between Phoenix and Tucson, Arizona, to define the bedrock surface configuration. Regional gravity effects were removed from the gravity data using a double Fourier series trend surface technique, and the gravity data were modelby using a two-dimensional iterative program. Analysis of both the complete Bouguer and residual gravity anomaly maps indicates that the Picacho Basin is a north-south trending graben-like structure with significant pediment development beneath as much as 2000 feet of alluvium. The maximum basin depth is nearly 15,600 feet. A thick (as much as 6000 feet) and extensive body of massive anhydrite lies situated between buried basin faults scarps that sometimes are in excess of 10,000 feet in vertical extent. Modeling also reveals an apparent strong correlation between modeled buried bedrock surface irregularities (generaly recognized as scarps and ridges) and the location of earth fissures near the basin periphery. Of the peripheral earth fissures crossed by profiles lines, 83% could be correlated within + or - 1/2 mile to a modeled bedrock surface irregularity.

SELECTED HYDROLOGIC DATA, 1931-77, WASATCH PLATEAU-BOOK CLIFFS COAL-FIELDS AREA, UTAH,

Geological Survey, Salt Lake City, UT. Water Resources Div.

K. M. Waddell, H. L. Vickers, and P. K. Contratto.

Open-file report 78-121, 1978. 33 p, 2 fig, 1 plate, 14 tab, 4 ref.

Descriptors: *Water quality, Effects, *Coal mines, *Surface waters, *Groundwater, Data collections, Streamflow, Discharge(Water), Springs, Water wells, Water levels, Drillers logs, Water analysis, Chemical analysis, Streambeds, Utah, *Wasatch Plateau-Book Cliffs coal-fields area.

The Wasatch Plateau-Book Cliffs coal-fields area in east-central Utah includes a significant part of the State's coal resources and is currently (1977) the most active coalmining area in the State. Data gathered by the U.S. Geological Survey are presented as part of a hydrologic reconnaissance in cooperation with the U.S. Bureau of Land Management during the period July 1975-September 1977 as well as selected data for the period 1931-75. Also included are selected data collected by private, State, and other Federal agencies. Types of data include water-level records, logs of selected wells, discharge of springs, wells, and mines, gaged and estimated streamflow, chemical analyses of water from springs, wells, mines, and streams, and laboratory analyses of streambed material and formation samples. The report is intended to make data available to those assessing the water resources that may be affected by coal-mining activities in the Wasatch Plateau-Book Cliffs coal-field are. (Woodard-USGS)

HYDROLOGIC DATA FOR URBAN STORM RUNOFF FROM THREE LOCALITIES IN THE DENVER METROPOLITAN AREA, COLORA-DO,

Geological Survey, Lakewood, CO. Water Resources Div. S. R. Ellis.

Available from OFSS, Branch of Distribution, USGS, Box 25425, Fed. Ctr. Denver, CO 80225, microfiche \$4.50 pc \$28. Open-file report 78-410, May 1978. 135 p, 4 fig, 3 plates, 59 tab, 6 ref.

Descriptors: *Urban runoff, *Storm runoff, *Water quality, *Path of pollutants, *Watershed management, Hydrologic data, Rainfall-runoff relationships, Snowmelt, Water analysis, Chemical analysis, Dissolved solids, Trace elements, Nutrients, Biochemical oxygen demand, Coliforms, Pesticides, *Colorado, *Denver area(Colo).

Urban storm-runoff data, collected from 1975 to 1977, on three catchment areas in the Denver, Colo., metropolitan area are presented. The catchment are predominantly a single-family residential catchment area in Littleton, a multifamily residential and commercial catchment area in Lakewood, and a high-density residential and commercial catchment area in Denver. Precipitation, rainfall-runoff, snowmelt-runoff, water-quality (common constituents, nutrients, biochemical oxygen demand, coliform bacteria, and solids, trace elements, and pesticides), and catchment-area data are necessary to use the U.S. Environmental Protection Agency's Storm Water Management Model II. The urban storm-runoff data may be used by planning, water-management, and environmental-protection agencies to assess the impact of urban storm runoff on the hydrologic system. (Woodard-USGS)

WATER WELLS AND SPRINGS IN PALO VERDE VALLEY, RIVERSIDE AND IMPERI-AL COUNTIES, CALIFORNIA,

Geological Survey, Laguna Niguel, Water Resources Div.

Sources Div.

W. R. Moyle, Jr., and M. J. Mermod.

Available from State of California Water Res. P.

O. Box 388, Sacramento, CA 95802, price \$5.00.
California Department of Water Resources, Sacramento, Bulletin 91-23, October 1978. 361 p, 1 fig, 6 tab. 12 ref.

Descriptors: *Groundwater resources, *Water wells, *Water levels, *Aquifer characteristics, *Water quality, Chemical analysis, Well data, Water utilization, Water level fluctuations, Geology, Maps, Sampling, Sites, California, *Palo Verde Valley, *Riverside County, *Imperial County.

This report lists ground-water data and shows the geologic mapping for Palo Verde Valley, California. The tables include: a description of wells and one spring, water levels, chemical analyses of water, public water-supply criteria, and results of pumping tests of wells. Maps show the geology and locations of the wells and spring. (Woodard-USGS) W79-02647

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977--VOLUME 2. RED RIVER BASIN.

Geological Survey, Oklahoma City, OK. Water Resources Div.

Water-Data Report OK-77-2, September 1978. 235 p, 8 fig.

Descriptors: *Oklahoma, *Hydrologic data, *Surface waters, *Groundwate, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, *Red River basin.

Water resources data for the 1977 water year for Oklahoma consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes or reservoirs. Volumes 1 end 2 of this report contain discharge records for 112 gaging stations; stage and contents for 22 lakes or reservoirs; water quality for 95 gaging stations, 3 lakes, and 8 wells; and water levels for 49 wells. Also included are 41 crest-stage partial-record stations and 1 low-flow partial-record station. Additional water data were collected at various sites, not part of the systematic data-collection program,

and are published as miscellaneous measurements. These data represent that part of the national Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Oklahoma. This report (volume 2) includes the Red River basin. (Woodard-USGS) W79-02665

WATER RESOURCES DATA FOR ARKANSAS, WATER YEAR 1977.

Geological Survey, Little Rock, AR. Water Resources Div. Water-Data Report AR-77-1, August 1978. 650 p, 5 fg, 3 tab.

Descriptors: "Arkansas, "Hydrologic data, "Surface waters, "Groundwater, "Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water levels, Data collections, Sites.

Water-resources data for the 1977 water year for Arkansas consist of records of stage, discharge, and water quality of streams, stage, contents, and water quality of streams, stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. This report contains discharge records for 70 gaging stations, stage only records for 1 gaging station; stage and contents for 13 lakes and reservoirs; water quality for 136 stations, 69 partial-record flow stations, and water levels for 82 observation wells. Also included are 119 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Arkansas. (Woodard-USGS) W79-02666

WATER RESOURCES DATA FOR OKLAHO-MA, WATER YEAR 1977--VOLUME 1. ARKAN-SAS RIVER BASIN.

Geological Survey, Oklahoma City. OK. Water Resources Div.

Water-Data Report OK-77-1, September 1978. 543 p, 8 fig.

Descriptors: *Oklahoma, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, *Arkansas River basin.

Water resources data for the 1977 water year for Oklahoma consist of records of stage, discharge, and water quality of streams, stage, contents, and water quality of lakes or reservoirs. Volume 1 and 2 of this report contain discharge records for 112 gaging stations; stage and contents for 22 lakes or reservoirs; water quality for 95 gaging stations, 3 lakes, and 8 wells; and water levels for 49 wells. Also included are 41 crest-stage partial-record stations and low-flow partial-record station. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Oklahoma. This report (volume 1) includes the Arkansas River basin. (Woodard-USGS)

WATER RESOURCES DATA FOR WEST VIR-GINIA, WATER YEAR 1977.

Geological Survey, Charleston, WV. Water Resources Div.
Water-Data Report WV-77-1, September 1978. 289
p, 4 fig.

Descriptors: *West Virginia, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment trans Cher Wate

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transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levles, Data collections, Sites.

Water resources data for the 1977 water year for West Virginia consist of records of stage, discharge, and water quality of streams and springs; stage and contents of lakes and reservoirs; and water levels in wells. This report contains discharge records for 129 gaging stations, stage only records for 2 gaging stations, stage and contents for 7 lakes and reservoirs, contents for 1 reservoir, water quality for 43 gaging stations, and water levels for 36 observation wells. Also included are 150 crest-stage partial-record stations. levels for 36 observation wells. Also included are 35 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in West Virginia. (Woodard-USGS) W79-02668

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WATER WETLANDS, AND WOOD STORKS IN SOUTHWEST FLORIDA, Florida Univ., Gainesville, Dept. of Environmental Engineering Sciences. For primary bibliographic entry see Field 2H. W79-02677

WHAT THE DESIGN ENGINEER NEEDS FROM THE HYDROMETEOROLOGIST,

CH2M Hill, San Francisco, CA. W. P. Henry, and J. J. Cassidy.

Journal of Applied Meteorology, Vol. 17, No. 10, p 1558-1563, October 1978. 9 ref.

Descriptors: *Design data, *Hydrologic data, *Meteorological data, Data processing, Analytical techniques, Construction, Hydraulic structures, Projects, Engineering, Design storm, Scheduling, Planning, Safety, Data, Weather data, Rainfall, Runoff, Water yield, Dams, Structures, Civil engineering, Meteorology, Hydrology, *Data requirements.

The water resources engineer is faced with three major types of problems when designing projects: (1) determination of project yield, (2) determination of project safety, and (3) determination of project scheduling. Hydrometeorology plays an important role in solving each type of problem. The most urgent needs the design engineer has for the expertise of the hydrometeorologist were identified and described. In addition, publications regularly read by design engineers were listed so that the hydrometeorologist can effectively communicate his information to the practicing engineer. (Sims-ISWS)

ENVIRONMENTAL PARAMETERS OF THE TENNESSEE RIVER IN ALABAMA: II. PHYSI-CAL, CHEMICAL, AND BIOLOGICAL PA-

Alabama Univ., in Huntsville. School of Graduate

Studies and Research.
For primary bibliographic entry see Field 5A.
W79-02781

APPLICATION OF COMPUTER WAVEFORM MATCHING TO MONITORING OF HYDROLOGIC SYSTEM PARAMETERS,

Nebraska Univ., Lincoln.

P. Chao-Hsing.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-291 432, Price codes: A06 in paper copy, A01 in microfiche Ph.D Dissertation, July 1977. 110 p, 20 fig. 16 tab, 37 ref. OWRT B-031-NEB(1), 14-31-0001-5088.

Descriptors: Computers, *Optimization, *Stream-flow simulators, *Modeling studies, *Simulation analysis, Monitoring, Mapping, Algorithms, Watershed models, *Waveform matching method.

A new waveform mapping approach to optimization of parameters in a streamflow simulator based on a distributed hydrologic system model has been designed, described and applied. Assuming initial values, the model parameters for the simulator are adjusted using information obtained from waveform-mapped comparisons of observed and predicted hydrographs. Optimization of the simulation parameters is performed by a two-dimensional transformation and regression technique which yields values of mapping parameters that provide the feedback information used for adjusting the model parameters. The algorithm has been tested both independently and in conjunction with watershed streamflow simulators. The results of these tests indicate the success of the original waveform matching method designed for parameter optimization in streamflow simulators. W79-02836

CHARACTERISTICS AND FILTERING OF NOISE IN LINEAR HYDROLOGICAL SYS-

Purdue Univ., Lafayette, IN. Water Resources Re-

search Center.
J. W. Delleur, and R. A. Rao.
In: Proceedings of Warsaw Symposium-Mathematical Models in Hydrology, July 1971, IAHS-AISH Publ. No. 101, p 570-579, 1974. 5 fig. 15 ref. OWRT-B-022-IND(5).

Descriptors: "Hydrologic systems, "Rainfall, "Runoff, Rainfall-runoff relationships, Fourier analysis, "Linear systems, Computational noise, "Digitization noise, Transfer functions, Filtered

The identification and fitting of a linear model of the short-range rainfall-runoff transformation are affected by the presence of noise generated by the computational procedure and by errors in the data. The digitization and computational noise is analysed by means of the Fourier amplitude spectra of the input and of the output. The effect of this noise may be reduced by judicious choice of the digitization step and of the truncation limits of the integrations in the transform domain. The rainfall data are smally more contaminated by noise due to error tions in the transform domain. The rainfall data are usually more contaminated by noise due to error than the runoff data. The noise attributed to the rainfall data is estimated and its probability distribution and spectrum are then obtained. The error noise may be controlled by digital filtering. The effectiveness of the filters is shown by comparing the rainfall noise spectra obtained from filtered and unfiltered data. unfiltered data.

GLACIER SURVEYS IN ALBERTA - 1975, Department of Fisheries and Environment, Ottawa (Ontario). Water Resources Directorate. For primary bibliographic entry see Field 2C. W79-02925

8. ENGINEERING WORKS

8A. Structures

DEVELOPMENT OF A HIGH PRECISION CA-PABILITY FOR MONITORING STRUCTURAL MOVEMENTS OF LOCKS AND DAMS, Army Engineer Topographic Lab., Fort Belvoir, VA. Research Inst.

VA. Research Inst.
K. D. Robertson.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A048 078,
Price codes: A04 in paper copy, A01 in microfiche.
Report ETL-0121, September 1977. 69 p, 6 fig, 16
tab, 2 ref, 4 append

Descriptors: *Surveys, *Surveying instruments, *Dams, *Locks, Movement, Deformation, Safety, Stability, Structures, Structural stability, Hydraulic structures, On-site investigations, Measurement, Engineering, Civil engineering, Precise surveying, Dam deformation, Trilateration.

A program of periodic inspection and continuing evaluation is required to insure the safety of many

civil works structures. This report documented a Corps of Engineers program to develop a capability within the various Engineer districts for making very high precision survey measurements of structures. The program consists of measurements of several structures and of training programs for survey personnel. Results of the measurements were included. (Sims-ISWS)

CENTRIFUGE MODELLING STUDIES ASSO-CIATED WITH DESIGN AND CONSTRUC-TION OF EARTH DAMS. All-Union Designing, Surveying and Scientific Re-search Inst. Hydroproject, Moscow (USSR). For primary bibliographic entry see Field 8D. W79-02857

CAPACITY STUDIES OF WINFIELD LOCKS, KANAWHA RIVER, WEST VIRGINIA, Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics Lab. For primary bibliographic entry see Field 8B. W79-02858

DUG-WELLS, DUG-CUM-BORE WELLS, AND TUBEWELLS, Central Groundwater Board, Nagpur (India). For primary bibliographic entry see Field 4B. W79-02994

8B. Hydraulics

UNSTEADY STREAMFLOW SIMULATION USING A LINEAR IMPLICIT FINITE-DIFFERENCE MODEL,

Geological Survey, NSTL Station, MS. Water Re-For primary bibliographic entry see Field 2E. W79-02644

WHAT THE DESIGN ENGINEER NEEDS FROM THE HYDROMETEOROLOGIST, CH2M Hill, San Francisco, CA. For primary bibliographic entry see Field 7C. W79-02683

SUSPENDED SEDIMENT AND BED MATERIAL STUDIES ON THE LOWER MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, MS. Potamology Section.
L. G. Robbins.
Available force the Mississippi

L. G. Robbins.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A044 285,
Price codes: A10 in paper copy, A01 in microfiche.
Report 300-1, August 1977. 227 p, 69 fig, 17 tab, 20
ref, 6 plate, 12 photo, 5 append.

Descriptors: *Potamology, *Mississippi River, *Sediments, *Data collections, Suspended solids, River beds, River basins, On-site data collections, Rivers, Alluvial channels, Sediment yield, Sedi-ment discharge, Sampling, Particle size, Bed load samples, Discharge(Water), Suspended load, Flow characteristics, Roughness(Hydraulic), Roughness coefficient

The ultimate purpose of sediment studies in the Army Engineer District, Vicksburg, is to develop a workable knowledge of the basic principles controlling the transport of sediment in the Lower Mississippi River and to apply this knowledge toward effective and economical stabilization works for flood control and navigation. The more immediate purpose of this report, however, was to present the data that have been collected and analyzed to date (1929-1974) and to show what trends exist in the quantities and sizes of suspended and bed sediments for the Vicksburg District. For this report, measurements of all available bed-material samples were presented, but presentation of suspended sediment measurements was limited to data collected at the 3 main discharge ranges since data collected at the 3 main discharge ranges since data at these ranges have been collected at regular.

Field 8—ENGINEERING WORKS

Group 8B-Hydraulics

frequent intervals. Some analysis of the data was made, but no theoretical aspects of sediment transport were presented. The information presented in the tables and graphs of this report may be considered as a step toward the realization of the ultimate purpose of sediment studies in the Lower Mississippi River. (Humphreys-ISWS) W79-02703

HYDRAULICS AND DYNAMICS OF NEW CORPUS CHRISTI PASS, TEXAS: A CASE HIS-TORY 1972.73

Texas Univ. at Austin, Port Aransas. Marine Sci-

ence Inst.

E. W. Behrens, R. L. Watson, and C. Mason E. W. Behrens, R. L. Watson, and C. Mason. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A038 472, Price codes: A07 in paper copy, A01 in microfiche. Army Coastal Engineering Research Center, Fort Belvoir, VA. GITI Report 8, Jan 1977. 126 p, 74 fig. 10 tab. 46 ref. 5 append. DACW72-72-C-0026, DACW72-72 C-0027.

Descriptors: *Inlets(Waterways), *Sediment transport, *Tidal waters, *Texas, *Gulf of Mexico, Beaches, Sediments, Sands, Tides, Waves(Water), Ocean waves, Sedimentation, Erosion, Hydraulics, *Corpus Christi Pass(Texas), Tidal inlets, Tidal

In 1972, a 2-mile channel was dredged through Mustang Island, Texas, to increase water exchange and fish migration between Corpus Christi Bay and the Gulf of Mexico. The pass' initial adjustment to tides, waves, and other forces was measured the first year following the opening. Hydraulic and sedimentary effects of the pass were studied by obtaining detailed bathymetric, topographic, and hydraulic surveys of the pass and adjacent gulf beaches; daily wave observations provided information on the seasonal variability in wave height, period, and direction. An estimated I million cubic mation on the seasonal variability in wave neight, period, and direction. An estimated 1 million cubic yards of sand accumulated at the pass during construction of two gulf jetties. Thereafter, a loss of sand greater than the estimated net annual longshore transport rate occurred on beaches south (downdrift) of the jetties. Considerable sediment (downdrift) of the jetties. Considerable sediment was deposited on shoals at the bay end of the pass with little accumulation in the pass. Hydraulic measurements indicated that channel frictional resistance increased by about 50% over the study period; although greater variability occurred during individual tidal cycles. Tidal discharges through the pass was highly dependent upon variations in the gulf tides, with equal volumes of ebb and flood flows during diurnal tides and strong flood predominance during mixed and semidiurnal cycles. The average discharge through the pass was only about 3% of the total tidal prism of Corpus Christs Bay, indicating that the bay tides, which partly control flow through the pass, result primarily from passage of the tide through Aransas Pass, the major bay-gulf connection. The pass was marginally stable during the first year, but the wide range of climatic conditions in the region probably will cause the pass to be stable in some probably will cause the pass to be stable in some years and unstable in others. Although the pass undoubtedly influences bay water within the immediate vicinity, no significant effect on flushing of Corpus Christi Bay resulted from the pass construction. (Sims-ISWS) W79-02707

CONTROL OF 1973 MISSISSIPPI RIVER

Army Engineer District, Vicksburg, MS. For primary bibliographic entry see Field 4A. W79-02717

CAPACITY STUDIES OF WINFIELD LOCKS, KANAWHA RIVER, WEST VIRGINIA, Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics Lab.
L. Daggett, and R. W. McCarley.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 382, Price codes: A06 in paper copy, A01 in microfiche. Miscellaneous Paper H-77-1, February 1977. 95 p, 16 fig, 17 tab, 2 ref, 5 append.

Descriptors: *Locks, *Navigation, *ialand waterways, *West Virginia, Rivers, Barges, Hydraulic structures, Model studies, Mathematical models, Simulation analysis, Evaluation, *Kanawha River(WV), River traffic, Facility capacity.

The Winfield lockage facilities, located near Winfield, West Virginia, currently consist of two 360-ft x 56-ft chambers with a normal lift of 28 ft. With the increasing traffic on the Kanawha River, these facilities Are no longer adequate to serve the towing industry using this portion of the inland waterway system. Excessive delays now occur at Winfield, and if the predicted traffic growth materializes during the next 10 or 15 years without action being taken to address the problem, transfers of traffic movements to other more costly modes of transportation will result. Accordingly, modes of transportation will result. Accordingly, modes of transportation will result. Accordingly, studies were conducted to determine the capacity of the existing lockage facilities and to evaluate possible solutions for increasing this capacity through the use of alternative operating policies and rules that have been beneficial at other lock sites. Using two simulation models, four alternative operating policies were simulated to determine operating policies were simulated to determine their respective effects on the capacity of the Win-field locks and the delays to be expected should such policies be possible. (Sims-ISWS) W79-02858

THE OXFORD UNIVERSITY WATER CAVITA-TION TUNNEL, DESCRIPTION AND OPER-ATING PROCEDURES.

Oxford Univ. (England). Dept. of Engineering Sci-

A. B. Bailey

Report No. 1083/74, 1974. 26 p, 9 fig.

Descriptors: *Cavitation, *Tunnel hydraulics, *Research facilities, Research facilities, Research equipment, Instrumentation, Equipment, Laboratory equipment, Tunnel pressure, Laboratory tests, Pumps, Flow, Hydraulics, Water circulation, Tun-nels. Cavitation tunnels.

The Oxford University water cavitation tunnel, like all tunnels for cavitation studies, comprises a closed hydraulic circuit with means for both circuit lating the water at pre-selected speeds past the test body and for controlling the mean ambient pres-sure around the body. This provides control over both the Reynolds number and the tendency to cavitate (cavitation number). The tunnel is unusual in that a diffuser for energy recovery is not fitted downstream of the test section; this arises due to its original configuration as a free jet tunnel. While absence of a diffuser renders the tunnel relatively uneconomical in running power consump-tion, the tunnel does have the advantage of remov-ing any restriction on the choice of test section configuration. (Sims-ISWS) W79-02860

EXPERIMENTS ON THE STRUCTURE OF TURBULENT SHEAR IN PIPE FLOWS OF

Florida Univ., Gainesville. Dept. of Engineering Science

R. R. Johnson, R. F. Elkins, E. R. Lindgren, and J.

A. 100. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 237, Price codes: A02 in paper copy, A01 in microfiche. The Physics of Fluids, Vol. 19, No. 9, p 1422-1423, September 1976. 4 fig. 7 ref. ONR N00014-75-C-1090, NSF ENG75-03470.

Descriptors: *Pipe flow, *Turbulent flow, *Laboratory tests, Instrumentation, Equipment, Photography, Data processing, Velocity, Turbulence, Tracers, Hydraulics.

A trace particle method by which three-dimensional turbulent velocity fields can be pictured in great detail, both qualitatively and quantitatively, was described. (Sims-ISWS) W79-02874

HYDRODYNAMIC TRANSPORT PHENOM-ENA IN ESTUARIES AND COASTAL WATERS, SCOPE OF MATHEMATICAL MODELS, Waterloopkundig Lab., Delft (Netherlands) and Rijkswaterstaat, Rijswijk (Netherlands). Data

Processing Div For primary bibliographic entry see Field 2L. W79-02983

DEVELOPMENT TUBEWELLS. CAVITY TYPE OF

Hodian Inst. of Tech., Kharagpur.

B. Anjaneyulu, A. C. Pandya, and A. P. Mishra.

In: International Symposium on Development of Ground Water Resources, November 26-29, 1973, Madras, India, Vol. 2, p III-87-III-94, 2 fig. 1 tab, 6

Descriptors: *Artesian aquifers, *Wells, Ground-water, Drilling, Inflow, Application methods, Drill holes, *Tube wells, *Cavity wells, Confined

Cavity wells are a special type of tubewells constructed in confined aquifers. The well boring is carried to the surface of the water bearing stratum and some small amount of sand is taken out with a sand boiler, crating an initial cavity. This cavity is further enlarged by pumping water at a high rate. The movement of the sand particles begins only when the drawdown is equal to the critical drawdown. This value is dependent on the properties of the aquifer material, such as mass and cohesiveness, and the radius of the initial cavity. It is, however, independent of the aquifer thickness. The mathematical development of these forces is presented. (Bradbeer-NWWA) W79-03000

8D. Soil Mechanics

SPECIFIC FEATURES OF CONSTRUCTION OF THAWED SOIL DAMS IN SEVERE CLIMATE CONDITIONS,

MATE CONDITIONS,
All-Union Designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR).
G. F. Biianov, and L. I. Kudoyarov.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A047 672, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 660, November 1977.
15 p. 2 fig. 2 ref. Translated from Soviet-American Working Seminar 'Technology of Construction of Structures under Cold-Climate Conditions', Moscow (USSR), p 16-28, May 1977.

Descriptors: *Earth dams, *Cold weather construction, *Permafrost, *Dam construction, Dams, Cold regions, Frozen soils, Thawing, Stability, Foreign research, Temperature, Dam foundations, Structures, Hydraulic structures, Engineering, Civil engineering, *USSR.

Thawed dams, which allow thawing of frozen soils in the foundation during operation, can be built, provided the deformations in the foundation due to provided inte detormations in the foundation due to thawing and thermal settling do not result in a loss of the stability of the structure. Development and implementation of a set of measures will make it possible to build dams out of binding soils in the Far North at temperatures down to -40 to -45C and to eliminate completely the seasonal nature of construction work. The dumping of excess water during construction over the crest of an uncompleted dam will make it possible to reduce the cost of building expensive temporary water diversion structures. (Sims-ISWS) W79-02693

THERMAL REGIME OF EARTH-ROCK DAMS CONSTRUCTED IN THE FAR NORTH,

Vsesoyuznyi Nauchno-Issledovatelskii Inst. Gidro-tekhniki, Leningrad (USSR). Sh. N. Plyat, N. A. Mukhetdinov, and E. A.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A047 538, Price codes: A02 in paper copy, A01 in microfiche.

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Soil Mechanics—Group 8D

CRREL Draft Translation 658, November 1977. 14 p, 4 fig. Translated from Proceedings of the Soviet-American Working Seminar Technology of Construction of Structures Under Cold Conditions,' held May 25-26, 1977 at Leningrad (USSR).

Descriptors: *Earth dams, *Rockfill dams, *Permafrost, *Cold weather construction, Model studies, Mathematical models, On-site investigations, Dams, Cold regions, Temperature, Measurement, Heat transfer, Freezing, Thawing, Civil engineering, *USSR.

The earth-rock dam predominates under Far North conditions because it is the most efficient and economical type of dam for handling medium and high heads. Hydraulic engineering construction practice has required scientific mastery of many problems which have arisen in designing earth-fill, high-head dams in the northern construction climate zone of the USSR. One question, whose solution is of primary importance for the development of economically efficient construction of earth dams and the technology for their exploitation, involves predicting and controlling the thermal regime of earth-rock dams during construction and operation. This report described methods developed to calculate the thermal regime of earth dams, along with data from field observations of such structures. (Sims-ISWS) W79-02694

FUNDAMENTALS OF CONSTRUCTING FROZEN TYPE EARTH DAMS IN THE

All-Union Designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR).
G. F. Biianov, G. F. Maslovskiy, and L. N.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A045 130, Price codes: A02 in paper copy, A01 in microfiche. CRREL Translation 651, October 1977. 14 p, 6 fig, 2 ref. May 1977, 16 p.

Descriptors: *Earth dams, *Cold weather construction, *Permafrost, *Frozen soils, Freezing, Soils, Dams, Spillways, Structures, Hydraulic structures, Construction, Cold regions, Ice, Heat transfer, Engineering, Civil engineering, *USSR, *Frozen type dams.

Available experience makes it possible to determine the main trends for improving the designs, methods, and techniques of erecting frozen and thawed dams from soil materials and also makes it possible to make some conclusions: (1) Frozen-type dams may be erected on weak, ice-saturated, frozen soils if dependable, frozen, antifiltration screens in the body of the dam are provided and are joined with the frozen soils of the base. (2) The design of the dam may be different, depending on the organization of work to erect the dam and to create the frozen screen. If the freezing system is installed prior to the beginning of constructing the dam and the frozen screen is created simultaneously with erection of the dam, the tuckstone of the argillaceous core may be eliminated as a structural member. (3) When work in erecting dams is organized with simultaneous installation of the frozen screen, it is possible to use local frozen water or clay mortars. The core of these dams may be erected by building up or pouring soil into the water. (4) The use of water-soluble heat carriers (brines) is not permitted to freeze the soils of the dam core since they thin the frozen soil in case of leaks. (Sims-ISWS)

EVALUATION OF STABILITY OF EARTH-FILL DAM BASED ON STRENGTH OF FROZEN ZONES OF ITS PROFILE,

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 255, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 628 July 1977. 6 p, 2 fig. Translated from Russian.

Descriptors: *Dams, *Earth dams, *Permafrost, *Cold weather construction, Freezing, Thawing, Cold regions, Soils, Frozen soils, Soil properties, Soil physical properties, Soil physics, Reservoirs, Stress, Hydrostatic pressure, Infiltration, Soil

When planning a permafrost dam, it is necessary to consider that the freezing of its lower wedge due to natural cooling of the surface of the lower slopes and the transfer of cold from the permafrost curtain may take 3 to 4 years if the soil is not allowed to freeze layer by layer during the filling process. This report discussed the strength and stability of earth filled dams based on durability of frozen zones of its profile. (Sims-ISWS) W79-02696

STUDIES OF NONSTATIONARY TEMPERA-TURE REGIME OF FROZEN DAMS MADE OF LOCAL MATERIALS ON PERMAFROST FOUNDATIONS.

N. V. Ukhova.

N. V. Ukhova.

Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A047 601,
Price codes: A02 in paper copy, A01 in microfiche.
CRREL Draft Translation 665, November 1977.
22 p. 1 fig. 4 ref. Translated from the author's
abstract of a dissertation in defense of the degree of
candidate in technical sciences, 1967. 18 p.

Descriptors: *Dams, *Permafrost, *Ice, *Temperature, Thermal properties, Rockfill dams, Earth dams, Thawing, Freezing, Structures, Hydraulic structures, Construction, Cold regions, Cold weather construction, *USSR, Frozen dams.

The specific characteristics of hydraulic engineering construction on permafrost foundations under harsh climatic conditions result in a situation in which the most economic type of dam in the regions is the type made of local materials. A distinction can be made between two methods of constructing dams from local materials on permafrost foundations: the 'warm' method, used when construction takes place primarily during the summertime by usual methods, and usually encountered in regions with moderate climates; and 'cold, when construction takes place in winter with stratified freezing of the entire dam or its individual elements, or in summer, with subsequent freezing of the structure. The frozen part of the dam is intended to make it impermeable to water. Reliable operation of partly or completely frozen dams is intended to make it impermeable to water. Reliable operation of partly or completely frozen dams is determined by the temperature regime of the construction and the foundation, which must be such that the frozen 'curtain' in the dam does not thaw out during the latter's operation. The dissertation was devoted to an analytical experimental study of the nonstationary temperature regime of frozen dams made of local materials on permafrost foundations, and reported on one aspect of the problem of construction of dams on permafrost foundations. (Sims-ISWS)
W70.07668 W79-02698

INVESTIGATION OF SLUMPING FAILURE IN AN EARTH DAM ABUTMENT AT KOTZEBUE, ALASKA,

ALASKA,
Cold Regions Research and Engineering Lab.,
Fairbanks, AK. Alaskan Projects Office.
C. M. Collins, and T. T. McFadden.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A042 306,
Price codes: A03 in paper copy, A01 in microfiche.
Special Report 77-21, July 1977. 25 p, 26 fig. 1 tab,
5 ref, 2 append. Pub. Health Serv. 243-76-0206.

Descriptors: *Earth dams, *Dam failure, *Permafrost, *Cold weather construction, *Alaska, Onsite investigations, Thawing, Freezing, Dams, Drill holes, Drillers logs, Thermal properties, Measurements, Slope stability, Slope stabilization, Cold regions, Civil engineering, *Kotzebue(Alaska), Slumping failure. Slumping failure.

A slumping failure on the upstream side in one area of the water supply reservoir at Kotzebue, Alaska, was investigated. Seven 80-ft (24.4-m) thermocouple strings were emplaced in the dam abutment,

and an additional four thermocouple strings were installed behind the dam, extending to a depth of 95 ft (28.9 m) below the bottom of the reservoir. All thermocouples indicated below freezing temperatures at their respective positions. These measurements combined with the drill logs indicated surements commoned with the drift logs indicated that neither the dam nor the abutment is in immediate danger of failure, but that steps must be taken to stop the sloughing of material in the abutment area. Recommendations were given to accomplish this. (Sims-ISWS) W79,02702

ANALYTICAL COMPUTATION OF THE THREE-DIMENSIONAL STEADY-STATE TEMPERATURE CONDITION OF A DAM,

TEMPERATURE CONDITION OF A DAM, P. A. Bogoslovskiy. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 655, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 601, Feb 1977. 9 p, 2 fig, 6 ref. p 24-30, 1970.

Descriptors: *Earth dams, *Permafrost, *Temperature, *Model studies, Mathematical models, Heatransfer, Frozen soils, Freezing, Thawing, Reservoirs, Dams, Cold regions, Cold weather construction, Structures, Hydraulic structures, Analytical techniques, Engineering, Civil engineering, *USSR.

Temperature conditions are of very great signifi-cance for earth dams based on permatrost ground. One of the indices of the temperature condition of One of the indices of the temperature condition, nonfiltering earth dams on a permafrost base is the steady-state (temporally invariable) temperature distribution for mean annual conditions, that is, for the mean water level in the reservoir, and the mean temperature readings at ground level. Tasks such as these were reviewed for two-dimensional condias these were reviewed to it wo-dimensional collina-tions on the assumption of a very broad river valley compared with the cross sectional dimen-sions of the dam. But consideration also must be given to three-dimensional conditions, where dams given to three-dimensional conditions, where dams abut the sides of valleys, for example, in order to evaluate the cooling influence of the sides of a valley, and other factors, in order to solve engineering problems. These questions ordinarily are elucidated by electrothermal analogy testing of models. These factors are the reason for seeking an analytical solution to the three-dimensional problems of the steady-state temperature field. (Sims-TSWS) W79-02856

CENTRIFUGE MODELLING STUDIES ASSO-CIATED WITH DESIGN AND CONSTRUC-TION OF EARTH DAMS,

All-Union Designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR). V. I. Shcherbina

V.I. Shcherbina.
Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A045 129,
Price codes: A02 in paper copy, A01 in microfiche.
CRREL Draft Translation 650, October 1977. 17
p, 7 fig, 7 ref. Moscow (USSR), May 1977. 18 p.

Many problems that arise during construction and design of earth hydroengineering complexes, such as estimating the bearing capacity of an inhomogeneous base, determining the lateral pressure of the soil, determining the criterion of crack formation in the cores of dams, estimating the stability of the slopes of structures, cannot be resolved confidently when conducting ordinary model experiments with full-scale soils. The main reason for this is that the stresses that the the stresses the stresses that the stresses the stresses the stresses that the stresses the stresses the stresses that the stresses the st ments with full-scale soils. The main reason for this is that the stresses due to the natural weight in the models are considerably less than those in real structures: at the same time, as shown previously the deformation and strength properties of soils under small and large stresses may differ considerable strength and teach the strength of the s under small and large stresses may differ considerably, and not only quantitatively but qualitatively as well. To overcome this difficulty permits the use of the centrifuge modelling method in investigations, the main advantage of which is the possibility of investigating relatively small models made of full-scale soil under stresses similar to full-scale in absolute value and by the nature of distribution. This report went into detail concerning this modelling technique. (Sims-ISWS)

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Field 8-ENGINEERING WORKS

Group 8D-Soil Mechanics

W79_02857

SILT SAMPLING STUDY, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville, OR.

ON. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A000 304, Price codes: A02 in paper copy, A01 in microfiche. Report No. 14-1, January 15, 1944. 20 p, 4 fig. 1

Descriptors: *Suspended solids, *Columbia River, *Bonneville Dam, Sediments, Silts, Quartz, Calcite, Diatoms, Clays, Sampling, Analysis techniques, Data processing, Seasonal, Erosion, Dams,

The purpose of the study was to determine, over a period of one year (1 April 1942 to 31 March 1943), the amount and character of the suspended material carried by the Columbia River at Bonneville Spillway Dam. The results of the study were: (1) The amount of suspended material carried by the Columbia River varied from a maximum of 638 p.p.m. to a minimum of 10 p.p.m. during the year of sampling; the average for the period was 76 p.p.m. (2) Petrographic and x-ray examinations of the suspended material showed the presence of varying amounts of quartz, calcite, diatoms, volcanic ash, clay minerals, and feldspar; quartz being the only one occurring in hard angular grains. (3) The fineness analyses of the silt indicated a fairly uniform size distribution for the year of sampling. (Sims-15WS) (Sims-ISWS) W79-02861

DAM OF THE ANADYRSK THERMAL ELEC-TRIC POWER STATION

A. L. Kuznetsov A. L. Auzinetsov.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A047 359, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 659, November 1977. 18 p, 6 fig. Translated from Trudy Gidroproyekta, No. 34, p 88-100, 1973.

Descriptors: *Earth dams, *Cold weather construction, *Permafrost, *Dam construction, Cold struction, "Permarrost, "Dam construction, Color regions, Dams, Construction, Design, Dam design, Soils, Frozen soils, Structures, Hydraulic struc-tures, Weather, Foreign countries, Foreign re-search, Temperature, Engineering, Civil engineering, *USSR

In 1964, a dam was constructed to supply water to the city of Anadyr' on the Chukotka Peninsula. The dam is 8.5 m high and 410 m long, and it impounds a reservoir with a volume of about 1 million cu m. It is planned to increase the reservoir capacity nearly seven-fold to meet the increasing requirements of the city and the thermal electric requirements or the city and the thermal electric power station under construction. A dam 16 m high (24 m including the toe) and a crest 1,500 m long will be required. The existing dam will be incorporated as the upper wedge of the new dam. The dam will be constructed in a permafrost area with severe climate and harsh engineering and geological conditions. This will be one of the larg-est dams built on friable permafrost sediment which settles after the soil thaws. The installation will include a dam, self-regulating spillway, and a stilling basin with pump. (Sims-ISWS) W79-02862

CRYOPEDOLOGICAL RESEARCH IN THE CONSTRUCTION OF DAMS UNDER SEVERE CLIMATIC CONDITIONS,

Kuybyshevskii Inzhenero-Stroitelnyi Inst. (USSR).

Kuybyshevskii Inzhenero-Stroitelnyi Inst. (USSR). Dept. of Hydraulic Engineering. N. A. Tsytovich, and Ya. A. Kronik. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 656, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 602, Feb 1977. 15 p. 2 fig. 19 ref. Translated from Sbornik trudov politicaskii. fig. 19 ref. Translated from Sbornik trudov po gidrotekhnike i gidrostroitel'stva pri stroitel'stve plotin v surovykh klimaticheskikh usloviyak, Moscow (USSR), 1970.

Descriptors: *Cold weather construction, *Dams, *Earth dams, Soils, Freezing, Frost, Permafrost, Frozen soils, Heaving, Frost heaving, Frost action, Structures, Hydraulic structures, Construction, Cold regions, Engineering, Civil engineering,

This article reviewed some of the initial results of complex cryopedological research based on the physicochemistry, physics, and mechanics of frozen soils. This research included: study of the problem of frost heave of soils, as applicable to hydraulic engineering practice and the development of the corresponding antiheave measures; study of questions concerned with heat and moisture transfer and temperature deformations; study of the processes involved in structure formation in frozen and thawing soils; development of methods for conducting field and laboratory cryopedological research and design of the corresponding instruments and meters; development of frost danger (heave-ability) and frost resistance of soils used in hydraulic engineering construction and the procedures to use to find these values; full-scale observations of temperature regimes and dam behavior; and the development of the thermal and physical bases for the preparation, storage, and winter bases for the preparation, storage, and winter placement of cohesive soils in qualitative hydraulic engineering embankments. (Sims-ISWS) W79-02867

DAM DESIGN AND CONSTRUCTION IN THE USSR'S NORTH AND SIBERIA.

All-Union Designing, Surveying and Scientific search Inst., Hydroproject, Leningrad (USSR).
L. K. Domansky, L. I. Kudoyarov, and V. G.

Radchenko.

Available from the National Technical Information Service, Springfield, VA 22161 as ADA-044 747, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 646, September 1977. 14 p. 9 fig, 10 ref. Translated from Soviet-American Working Seminar Technology of Cooperative Construction in Extreme North Climates, Leningrad (USSR), May 1977.

Descriptors: *Cold weather construction, *Dams, *Earth dams, *Dam design, Concrete dams, Cold regions, Frozen soils, Permafrost, Freezing, Thawing, Temperature, Structures, Hydraulic structures, Construction, Engineering, Civil engineering, *USSR, *Siberia(USSR).

On the basis of major experimental work and with On the basis of major experimental work and with the use of modern methods of calculating temperature regimes in dams, scientifically justified methods of planning hydrotechnical installations have been worked out for the Far North; basic principles have been established for the design of both earth and concrete dams; and engineering procedures have been introduced that make it possible to work year-round on dam construction. The comwork year-round on dam construction. The construction of many dams with various heads has yielded great deal of experience and proved the possibility of successfully erecting dams under the most severe conditions in the Far North of the USSR. (Sims-ISWS) W79-02868

PREDICTING PERFORMANCE OF PIPE CUL-

VERTS BURIED IN SOIL,
Purdue Univ., Lafayette, IN. Engineering Experiment Station. G. A. Leonards, and M. B. Roy.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 638, Price codes: A11 in paper copy, A01 in microfiche. Report No. FHWA-JHRP-76-15, May 1976. 235 p, 46 fig. 7 tab, 95 ref, 5 append. C-36-32F, HPR-1(12) Pt II.

Descriptors: *Culverts, *Pipes, *Structural design, *Underground structures, Analytical techniques, Finite element analysis, Numerical analysis, Computer programs, Loads(Forces), Mathematics, Soils, Soil properties, Anisotropy, Construction materials, Stress analysis, Strain.

An analytical tool based on the finite element method was developed to analyze buried culvert

problems in a realistic fashion. Segments of a curved bar with three degrees of freedom (normal, tangential, and rotational) at each end were used to simulate a thin pipe where nodal moments are important. Triangular, isoparametric elements with one curved boundary (to fit the shape of pipe), and three midside nodes were used to represent the soil. A special type of 'interaction' element with zero thickness was used between pipe and soil to simulate interface behavior, including slip and/or the inability to resist tensile stresses. Nonlinear, anisotropic soil properties were accounted for. Actual test data were used as input for soil properties. A computer program was written to include all the aspects mentioned above, and example problems were solved to demonstrate its versatility and to investigate the influence of such factors as non-linear soil properties, relative stiffness of pipe and soil, inclusion of weak materials near the spring line, and construction procedures. The present program is applicable only for analysis of two-dimensional problems transverse to the pipe in which the state of stress either in the soil mass or in the pipe does not approach failure. (Humphreys-ISWS) W79-02869

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RECOMMENDED PRACTICE FOR THE DESIGN AND CONSTRUCTION OF EARTH DAMS FOR INDUSTRIAL AND POTABLE WATER SUPPLY IN THE FAR NORTH AND PERMAFROST AREAS.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A044 748, Price codes: A06 in paper copy, A01 in microfiche. CRREI Draft Translation 647, September 1977. 121 p, 49 fig, 14 tab, 7 append. 113 p. Kuz'mina, L.N. editor.

Descriptors: *Earth dams, *Cold weather construction, *Dams, *Hydraulic structures, Permafrost, Cold regions, Construction, Structures, Soils, Frozen soils, Freezing, Thawing, Temperature, Foundations, Dam foundations, Water resources, Water supply, Engineering, Civil engineering, *USSR.

The problem of erecting permanent earth dams in water-engineering systems built to supply potable and process water were examined. The dams in question were frozen dams, intended for operation with the impervious element and its foundation kept permanently in the frozen state. Specific problems of erecting thawed dams in the Far North also were examined. (Sims-ISWS) W79-02871

ANALYSIS OF CONSOLIDATION OF EARTH AND ROCKFILL DAMS, VOLUME I, MAIN TEXT AND APPENDICES A AND B,

California Univ., Berkeley, Coll. of Engineering. C. S. Chang, and J. M. Duncan.

C. S. Chang, and J. M. Duncan.
Available from the National Technical Information
Service, Springfield, Va 22161 as AD-A045 332,
Price codes: A07 in paper copy, A01 in microfiche.
Contract report S-77-4, Volume 1, Army Engineer
Waterways Experiment Station, Vicksburg, Mississippi, September 1977. 143 p. 52 fig, 3 tab, 71 ref, 2
sppend. DACW39-74-C-0027.

Descriptors: *Earth dams, *Soils, *Consolidation, *Model studies, Mathematical models, Clays, Saturated soils, Rockfill dams, Instrumentation, Dams, rated soils, Rockfill dams, Instrumentation, Dams, Finite element analysis, Soil water, Soil water movement, Permeability, Compressibility, Stress, Flow, Theoretical analysis, Soil science.

This study was undertaken to develop the theory for analyzing the consolidation of partly saturated clay soils, and subsequently to develop a practical procedure for performing finite analyses of the behavior of dams during construction, during reservoir filling, and during the development of long-term seepage. The theory developed couples the effects of both stress and flow and takes account of the varying permeability and compressibility of the pore fluid and the nonlinear stress-strain behavior of the soil. A number of elastic-plastic, stress-strain relationships were reviewed with respect to their capabilities for modeling the stress-strain behavior

Concrete-Group 8F

of compacted clays. The results of this study indi-cated that the behavior of the dam during consoli-dation is closely related to the stiffness and degree of saturation of the core. The finite element proceor saturation of the core. I he finite element proce-dure developed is a potentially useful tool. It seems likely that its greatest value in application will be in connection with interpretation of instrumenta-tion studies for zoned earth and rockfill dams. (Sims-ISWS) W79-02875

8E. Rock Mechanics and Geology

REVIEW AND ANALYSIS OF BLASTING AND VIBRATIONS AT BANKHEAD LOCK. Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab. For primary bibliographic entry see Field 8H.

RESULTS OF IN SITU MODULUS OF DEFORMATION TEST, CANNELTON LOCK AND DAM.

Army Engineer Waterways Experiment Station, Vicksburg, MS. R. L. Stowe.

R. L. Stowe. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 827, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper C-71-4, May 1971. 47 p, 32

Descriptors: *Deformation, *Borehole geophysics, *Rock mechanics, *Rock properties, On-site investigations, Rocks, Shales, Limestones, Strength, Loads(Forces), On-site tests, Foundations, Rock foundations, Locks, Dams, Civil engineering, Geology, *Cannelton Lock and Dam(Ohio River), plate bearing tests.

An NX-size, borehole, plate-bearing device known as a Goodman jack was used to perform 31 load deformation tests in the foundation rock, Pier No. 3, at Cannelton Lock and Dam. The in situ modulus of deformation was calculated using the load deformation data. These data were examined to evaluate the quality of the foundation rock; the evaluate the quanty of the foundation rock; the foundation rock consists of Menard formation limestone, Waltersburg shale, Vienna limestone, and Tor Springs sandstone. The test results indicated that the top 35 ft of Waltersburg shale near the upstream side of Pier No. 3 is about twice as competent as the shale near the downstream side. The average moduli of deformation are 18,620 and 38,650 psi for the upstream and downstream sides, respectively. Moduli for the limestones and the sandstone are above 100,000 psi. The load deformation curves exhibit accelerated displacement at load levels above 500 psi. This displacement is due to either shear failure of the shale, sliding along pre-existing planes of weakness, or a combination of both. (Sims-ISWS) W79-02710

THE OXFORD UNIVERSITY WATER CAVITA-TION TUNNEL. DESCRIPTION AND OPER-ATING PROCEDURES,

Oxford Univ. (England). Dept. of Engineering Sci-

For primary bibliographic entry see Field 8B. W79-02860

SPRAY GROUTING: SUMMARY OF RE-SEARCH, DEVELOPMENT, UTILIZATION, AND FUTURE USES,

Minnesota Univ., Minneapolis, Dept. of Civil and Mining Engineering.

For primary bibliographic entry see Field 8F. W79-02863

EFFECT OF SUBZERO TEMPERATURE IN CONCRETE ON THE NATURE OF OPERATIONS OF HIGH CONCRETE DAMS,

8F. Concrete

V. N. Durcheva.

Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A027 016,
Price codes: A02 in paper copy, A01 in microfiche.
CRREL Draft Translation 531, July 1976. 8 p, 3
fig. Translated from Gidrotekhinicheskoe Stroitel'stvo, No. 3, p 26-29, March 1973.

Descriptors: *Dams, *Reservoir operations, *Cold regions, Concrete, Concrete structures, Concrete dams, Temperature, Freezing, Cold weather construction, Stress, Construction joints, Expansion joints, Thermal expansion, Loads(Forces), Engineering, Civil Engineering, *USSR.

Comprehensive, large-scale studies of the dams of the Bratsk and Krasnoyarsk hydroelectric stations have provided a wide range of experimental mate-rial on the operation of high dams under severe climatic conditions and, in particular, have re-vealed the role of temperature as the most impor-tant factor causing deformation and stress in dams. The calculation of temperature stresses which arise in dams during construction and during operation in dams during construction and during operation does not take into consideration the changes in the does not take into consideration the changes in the physical and mechanical properties of frozen concrete. This is hindered by the lack of qualitative relations which define the effect of subzero temperature on the principal characteristics of monolithic hydroengineering concrete. Experimental and full-scale studies of the properties of frozen concrete have made it possible to recommend empirical relationships for determining the linear expansion coefficient as a function of the subzero temperature of concrete and its strength. (Sims-ISWS)

CONCRETE PLACING TECHNIQUES USED DURING THE CONSTRUCTION OF THE KRASNOIARSK HYDROELECTRIC POWER PLANT.

Ye. A. Dolginin.

Ye. A. Dolgmin.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 967, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 534, July 1976. 13 p, 3 fig. 4 tab. Translated from No. 9, p 19-23, September 1972.

Descriptors: *Concrete dams, *Dam construction, *Cold weather construction, Winter, Construction, Dams, Powerplants, Hydroelectric power, Con-crete, Concrete structures, Freezing, Stress, Strength, Temperature, Engineering, Civil engi-neering, *USSR, Construction techniques.

The concrete Krasnoyarsk hydroelectric station dam, 124 m high, is approximately 1,100 m long and is located in a relatively narrow rocky canyon of the Yenesey River. The amount of concrete in the dam and hydroelectric station building is 5.5 million cu m. The concrete operations were accomplished under severe climatic conditions—the frost-free period was 102 days long and temperatures ranged from -54 to 37C. Great requirements were levied on the concrete with regard to strength, imperviousness to water, cavitation resistance, cold resistance, and fracturing resistance. This report discussed the construction problems and considerations. (Sims-ISWS) W79-02691

COEFFICIENT OF LINEAR EXPANSION OF MASSIVE CONCRETE AT A NEGATIVE TEM-PERATURE

S. Ya. Eydel'man, and V. N. Durcheva. S. Ya. Eydel man, and V. N. Durcneva. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 067, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 537, July 1976. 19 p, 9 fig, 3 tab, 6 ref. Vol. 84, p 158-170, 1967.

Descriptors: *Concrete, *Thermal expansion, *Concrete dams, *Cold regions, Freezing, Thawing, Dams, Stress, Expansion, Deformation, Construction joints, Expansion joints, Temperature, Cold weather construction, On-site investigations, Laboratory tests, Concrete testing, Engineering, Civil engineering, *USSR.

The article presented the results of full-scale extensometric measurements of free thermal deformations of concrete in 41 sections of the Bratsk hydroelectric station dam at a negative temperature. It was shown that the coefficient of linear expansion of frozen concrete is 1.6 times greater, on the average, than at a positive temperature, and that there is a relationship between these coefficients and the strength of the concrete. Melting of the concrete is accompanied by the appearance of residual deformation of elongation. Tests specially conducted on samples 10 x 10 x 40 cm in size of different composition of the concrete yielded similar results. Data were provided on the effect of a change in the value of the coefficient of linear expansion of the frozen concrete on openings of construction joints and cracks as well as the stress state of the concrete. (Sims-ISWS)

CONSTRUCTING CONCRETE DAMS IN REGIONS WITH SUBZERO AVERAGE YEARLY TEMPERATURE, K. A. Mal'tsov, Sh. N. Plyam, and L. I. Kudoyarov.

Kudoyarov. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 936, Price codes: A02 in paper copy, A01 in microfiche. CRREL Draft Translation 549, October 1976. 9, 5 fig, 10 ref. Translated from Izvestiya Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Gidro-tekhiki, Vol. 101, p 133-138, 1973.

Descriptors: *Concrete structures, *Concrete dams, *Cold weather construction, *Cold regions, Dams, Construction, Temperature, Freezing, Permafrost, Thermal expansion, Strength, Mechanical properties, Structures, Hydraulic structures, Concrete, Expansion, Deformational Engineering, Civil engineering, *USSR.

Building concrete hydraulic engineering structures in regions with severe climatic conditions characin regions with severe climatic conditions charac-terized by a sub-zero average yearly temperature raises a number of problems which do not occur when dams are construted in regions with a mod-erate or warm climate. These problems arise be-cause of the complete freezing of a considerable amount of the embankment of a concrete dam amount of the embankment of a concrete dam during the operational period on the one hand, and the change in the thermomechanical properties of the concrete (coefficient of linear expansion, strength, modulus of elasticity, etc.), on the other hand. This report addressed those problems. (Sims-ISWS)

POTENTIAL ALKALI-CARBONATE ROCK REACTIVITY OF SOME OF THE AGGREGATE USED IN FISHTRAP DAM, Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab. A. D. Buck.

A D. Buck. Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 761, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper C-76-3, June 1976. 24 p. 4 fig.

Descriptors: *Aggregates, *Alkali-aggregate reactions, *Laboratory tests, *Concrete testing, Concrete, Dams, Spillways, Concrete dams, Carbonate rocks, Chemical reactions, Alkalis(Bases), Petrography, Cores, Coarse aggregates, Analytical techniques, Civil engineering, *Fishtrap Dam(Ky).

Two samples of carbonate rock coarse aggregate were obtained from the quarry that furnished some of the coarse aggregate for Fishtrap Dam, located near Pikeville, Kentucky. These materials were subjected to petrographic examination. Small rock cores were prepared from some of these aggregate

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Field 8—ENGINEERING WORKS

Group 8F—Concrete

particles and were tested for length change in particles and were tested for length change in sodium hydroxide solutions. Five concrete mixiumes were made in the laboratory using these aggregates; specimens from these mixtures were made in the laboratory using these aggregates; specimens from these mixtures were tested for length change during moist storage or during storage in laboratory air followed by moist storage other specimens were tested for compressive strength. Six concrete cores from the spillway portion of Fishtrap Dam were received in the laboratory. They were inspected and photographed. Thin sections were made, and selected specimens were tested for length change during specimens were tested for length change during moist storage. It was concluded that an alkali-carbonate rock reaction had occurred at Fishtrap Dam. There was no indication that this was a deleterious reaction. It is likely that the use of low alkali portland cement and relatively small aggre-gate size served to keep the reaction at a safe level. It is also possible that natural dilution of the reac-tive rock by innocuous rock had a moderating effect on the reaction. (Sims-ISWS) W79-02705

ENGINEERIN CONDITION SURVEY AND STRUCTURAL INVESTIGATION OF EMS-WORTH LOCKS AND DAM, OHIO RIVER,

Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 844, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper C-76-8, August 1976. 153 p, 52 fig, 2 tab, 3 ref, 1 append.

Descriptors: *Locks, *Dams, *Ohio River, *Structural analysis, *Structural stability, Structures, Concrete, Concrete structures, Concrete dams, Concrete testing, Surveys, Stress, Strength, Cracks, Weathering, Evaluation, Engineering, Civil engineering, *Emsworth Locks and Cracks, Weathering Civil engineering, Dam(Ohio River).

The Concrete Laboratory at the Army Engineer Waterways Experiment Station was contracted to prepare an engineering condition survey and struc-tural investigation for Locks and Dam 3, Monongahela River, and Emsworth and Montgomery Locks and Dams, Ohio River. This report gave the results of an engineering condition survey and a structural analysis of Emsworth Locks and Dam, Ohio River. In general, the monoliths on the land wall do not meet present day criteria for overturning, sliding, or base pressures. Also, some mono-liths in the middle and river walls do not meet present day stability requirements. In fact, the sta-bility analysis of M-22 along with the visual obser-vation of a 1-1/2 inch separation between the ceiling of the emptying culverts and the middle wall indicated that there has been some movement of these middle wall monoliths. The main concern for concrete interity is the cracked, spalled, and deteriorated surface concrete which will allow ac-celerated deterioration, reducing the effective section of the monoliths and increasing the already excessive tensile stresses. In general, if corrective measures are not taken, this will surely cause main-tenance expense and also will reduce the life of the concrete monoliths. The compressive stresses are larger than indicated by the stress analysis and also can cause problems in deteriorated concrete. From the deteriorated condition of the surface of the lock monoliths, it is evident that some action must be initiated. Since corrective action is needed, a feasibility study should be made to determine what action is necessary which will provide the most economical and adequate lock usage over a period of 30 to 50 years. (Sims-ISWS) W79-02706

CONDITION SURVEY OF LOCK AND DAM 3,

OHIO RIVER, Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab.

B. J. Houston.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 817, Price codes: A04 in paper copy, A01 in microfiche.

Miscellaneous Paper C-74-7, May 1974. 61 p, 28 fig, 3 tab, 6 ref, 5 append.

Descriptors: *Locks, *Dams, *Ohio River, *Structural analysis, Structural stability, Structures, Concrete, Concrete structures, Concrete testing, Surveys, Borehole cameras, Photography, Stress, Cracks, Weathering, Evaluation, Engineering, Civil engineering, *Lock and Dam (3/Ohio Phine) gineering, Civ. 53(Ohio River).

A condition survey of Lock and Dam 53, which is located on the Ohio River between Paducah, Kentucky, and Cairo, Illinois, was authorized and funded by the Army Engineer District, Louisville, in April 1973, Lock and Dam 53 was constructed in April 1973. Lock and Dam 53 was constructed approximately 45 years ago, and the purpose of this investigation was to determine the general condition of the structure in order that effective plans could be made to accomodate present and future river traffic. The Army Engineer Waterways Experiment Station was requested to conduct a part of the investigation, including a crack survey, borehole camera studies in drilled holes, and sonic studies of the structure. The Ohio River Division Laboratory (ORDL) conducted physical tests and a petrographic examination of drilled concrete cores. Results of ORDL's tests were included in this report. The results of the investigacluded in this report. The results of the investigations indicated that the concrete in the underwater sills, the piers, and the fixed weir is dense, homogeneous concrete free from damage from cement-aggregate reaction, from sulfate attack, and from aggregate reaction, from sulfate attack, and from serious frost damage. Cracking of the concrete was extensive, but not excessive, and apparently can be attributed to physical causes such as freeze-thaw cycles of the exposed concrete, normal shrinkage, and minor foundation problems. Excessive cracking was found only in pier 2. The cracking in pier 2, however, is not considered to be structurally damaging. (Sims-ISWS)

NONMETALLIC WATERSTOPS,

Army Engineer Waterways Experiment Station, Vicksburg, MS. urg, MS

G. C. Hoff, and B. J. Houston. Available from the National Technical Information Service, Springfield VA 22161 as AP ASSAURA Service, Springfield, VA 22161 as AD-A030 955, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper C-70-22, October 1970. 31 p, 7 fig. 3 tab, 16 ref.

Descriptors: *Concrete structures, *Waterproofing, *Watertight, *Sealants, Laboratory tests, Onsite investigations, Weathering, Tensile strength, Physical propeties, Materials, Materials testing, Construction joints, Expansion joints, Concrete, Civil engineering, *Waterstops, *Nonmetallic waterstops

Nonmetallic waterstops having suitable properties for use in joints in hydraulic structures of concrete have been made successfully from natural rubber, synthetic rubber, and polyvinyl chloride. To per-form satisfactorily, a waterstop must have sufficient strength and extensibility to avoid being ruptured by joint movement, and it must maintain strength and extensibility over the temperature range and in spite of chemical attack from the environment of service. The waterstop also must have suitable dimensions and configuration and be installed so as to avoid waterflow around the em-bedded ends. Field and laboratory studies led to the conclusion that suitable waterstop materials should have a tensile strength of at least 1,400 psi (plastic), 2,000 psi (rubber), the ability to elongate 280% (plastic) or 360% (rubber), and to have various levels of maintenance of relevant properties after various chemical and thermal exposures. (Sims-ISWS) W79-02712

LABORATORY TESTS OF CONCRETE AGGREGATE AND RIPRAP FOR NEW LOCK AND DAM NO. 26,

Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab. W. O. Tynes, and C. R. Hallford.

Available from the National Technical Information

Service, Springfield, VA 22161 as AD-A029 838, Price codes: A06 in paper copy, A01 in microfiche. Miscellaneous Paper C-72-4, March 1972. 113 p, 16

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Descriptors: *Aggregates, *Mississippi River, *Riprap, *Rocks, *Concrete, Dams, Locks, Laboratory tests, Testing, Coarse aggregates, Limestones, Carbonate rocks, Construction materials, Strength, Chemical reactions, Structures, Hydraulic structures, Concrete technology, Engineering, Civil engineering, *Lock and Dam No. 26(Mississipni River) sippi River).

Ledge rock from 3 commercial sources was tested for suitability for use as riprap, and material from 1 of the sources of ledge rock as well as crushed aggregate also were tested for use as concrete coarse aggregate. Drilled 6-inch-diameter cores from 2 commercial sources were tested for suitability for water tested for suitability for water tested for suitability for the suitability coarse aggregate. Drilled b-inch-diameter cores from 2 commercial sources were tested for suitability for use as riprap and concrete coarse aggregate. A coarse sand and a blending sand were tested for use as concrete fine aggregate. Crushed aggregate manufactured from each of the 2 cores and 1 of the ledge rocks was tested in combination with blends of the coarse and fine sand for freezing and thawing of concrete aggregate. Results of the petrographic etamination and tests on 5 sources of carbonate rock for riprap were reported. Consideration of the results of the freezing-and-thawing tests conducted according to CRD-C 144 on 3 sources of carbonate rock for use in concrete indicated similarity. However, it appears that the material from 1 company is preferable to the others because it is thicker bedded. Material from a nearby quarry was used previously in the Alton Lock and Dam, and its known to be a reactive carbonate rock. Reaction rims have been observed in the Alton concrete. Considerations of field behavior of the Alton concrete and laboratory testing for length change of crete and laboratory testing for length change of the Alton concrete showed that this is not an expansive reaction and no precautionary measures are required for its use. Evaluation of rock from for potential reactivity indicated that that Columbia rock was not reactive. However, some of the ledge 3 Riverview rock is potentially reactive. (See also W77-10978) (Sims-ISWS) W79-02854

SPRAY GROUTING: SUMMARY OF RE-SEARCH, DEVELOPMENT, UTILIZATION, AND FUTURE USES,

Minnesota Univ., Minneapolis, Dept. of Civil and Mining Engineering. C. R. Nelson.

C. R. Nelson. Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 340, Price codes: A02 in paper copy, A01 in microfiche. Report NSF-RA-T-75-073, December 8, 1975, 5 p. NSF GI-37862X.

Descriptors: *Grouting, *Cement grouting, *Tunneling, *Sandstones, Rocks, Tunnels, Stability, Strength, Tunnel linings, Rock bolts, Tunnel construction, Spraying, Sodium compounds, Civil engineering, *Spray grouting.

A spray grouting technique was developed for hardening a 1 to 6 inch surface layer of weak sandstones, such as the St. Peter Sandstone in Minnesota. When used on tunnel walls and roofs, the technique provides temporary excavation sup-port in larger tunnels and a permanent lining in smaller utility tunnels. This eliminates or reduces the need for more costly conventional support. The research and development has cost about \$100,000 in RANN funds, and \$50,000 of industry user funds. The technique is being used now in an 8,000 foot long storm water tunnel and in a 6,500 foot long utility tunnel. The estimated savings from the use of the new method is \$1,300,000 on these two projects. Increased use of the method is expected. (Sims-ISWS)
W79-02863

DESIGNING CONCRETE DAMS FOR ESPE-CIALLY HARSH CLIMATIC CONDITIONS,

All-Union Designing, Surveying and Scientific Research Inst., Hydroproject, Leningrad (USSR).

Rapid Excavation—Group 8H

29 838, rofiche. 13 p, 16

River, s, Labo-Limes-aterials,

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Available from the National Technical Information
Service, Springfield, VA 22161 as AD-A047 592,
Price codes: A02 in paper copy, A01 in microfiche.
CRREL Draft Translation 657, November 1977.
20 p. 4 fig. 8 ref. Translated from a collection of
articles from the Gidroproyekt Institute imeni S.
Ya. Zhuk, Leningrad (USSR), p 32-46.

Descriptors: *Dams, *Cold weather construction, *Dam design, *Concrete dams, Cold regions, Powerplants, Design, Planning, Dam construction, Dam foundations, Temperature, Freezing, Concrete, Foreign research, Construction, Structures, Hydraulic structures, Engineering, Civil engineering, *USSR.

During the last 20 years, extensive hydraulic engineering construction projects have advanced far into the depths of regions of the USSR with harsh and very harsh climates. Exploitation of the very rich energy resources of the rivers in the central and eastern parts of Siberia, the coastal regions, and the Far North has posed a number of complex problems which had not been encountered before by designers and builders of hyraulic engineering projects. This report discussed the principal aspects of designing concrete dams on rock foundations in regions with especially harsh climates. (Sims-ISWS)
W79-02:64 W79-02:64

8G. Materials

EFFECT OF SUBZERO TEMPERATURE IN CONCRETE ON THE NATURE OF OPERATIONS OF HIGH CONCRETE DAMS, For primary bibliographic entry see Field 8F. W79-02690

EVALUATION OF LINER MATERIALS EX-POSED TO LEACHATE,

Matrecon, Inc., Oakland, CA.

Matrecon, Inc., Oakland, CA.
H. E. Haxo, Jr., and R. M. White.
Available from the National Technical Information
Service, Springfield, VA 22161 as PB-259 913,
Price codes: A04 in paper copy, A01 in microfiche.
Report EPA-600/2-76-255, September 1976. 63 p,
3 fig. 22 tab, 5 ref, 1 append. EPA 68-03-2134.

Descriptors: *Linings, *Materials, *Leachate, *Laboratory tests, Materials testing, Evaluation, Landfills, Membranes, Impervious membranes, Asphalt, Plastics, Polymers, Soil cement, Soil asphalt, Rubber, Water pollution, Water pollution control, Liner materials.

This report presented available information covering the first year's exposure to liner materials to sanitary landfill leachate. Included in the report were descriptions of the monitoring and disassembly of the generators to recover the liner specimens, the results of the testing of the exposed liners, and a discussion of the results. The year's exposure did not result in losses of impermeability in any of the liners. There were some losses, however, in the compressive strength of the admix liner exposure did not result in losses of impermeability in any of the liners. There were some losses, however, in the compressive strength of the admix liner materials. There were some losses in the physical properties of some of the polymeric membranes and swelling of most of these membranes. The seams of several lost strength, the crystalline types of polyethylene, polypropylene, and polybutylene sustained the least change during the year's exposure. However, these liners, or films, are prone to puncture and tear and are generally difficult to handle in the field. The thermoplastic membranes, chlorinated polyethylene, chlorosulfonated polyethylene (Hypalon), and polyvinyl chloride, tended to swell the most. The vulcanized rubbery liner materials, e.g., butyl and EPDM, changed little during the exposure period but had the lowest initial seem strength. The data presented must be considered as preliminary in an ongoing project, it is premature at this point to make estimates of the service life of the various materials or to make relative comparisons among them for use in a given installation without consideration to costs and to the specifics of the installation. (Sims-ISWS) and to the specifics of the installation. (Sims-ISWS) W79-02704

POTENTIAL ALKALI-CARBONATE ROCK RE-ACTIVITY OF SOME OF THE AGGREGATE USED IN FISHTRAP DAM, Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab. For primary bibliographic entry see Field 8F. W79-02705

ENGINEERIN CONDITION SURVEY AND STRUCTURAL INVESTIGATION OF EMS-WORTH LOCKS AND DAM, OHIO RIVER, Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab.
For primary bibliographic entry see Field 8F. W79-02706

DEVELOPMENT OF A HIGH PRECISION CA-PABILITY FOR MONITORING STRUCTURAL MOVEMENTS OF LOCKS AND DAMS, Army Engineer Topographic Lab., Fort Belvoir, VA. Research Inst. For primary bibliographic entry see Field 8A. W79-02708

RESULTS OF IN SITU MODULUS OF DEFORMATION TEST, CANNELTON LOCK AND DAM,

Army Engineer Waterways Experiment Station, Vicksburg, MS. For primary bibliographic entry see Field 8E. W79-02710

CONDITION SURVEY OF LOCK AND DAM 3, OHIO RIVER,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab. For primary bibliographic entry see Field 8F. W79-02711

NONMETALLIC WATERSTOPS, Army Engineer Waterways Experiment Station, Vicksburg, MS. For primary bibliographic entry see Field 8F. W79-02712

AN INVESTIGATION OF ICE FORCES ON VERTICAL STRUCTURES, Iowa Univ., Iowa City. Inst. of Hydraulic Re-

search. For primary bibliographic entry see Field 2C. W79-02865

CONDITION SURVEY-ASBESTOS-BONDED STEEL CULVERTS IN WESTERN OREGON, Federal Highway Administration, Portland, OR.

Federal Highway Administration, Portland, OR. Region 10.
S. Deocampo, T. Gruber, and B. Wasill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 377, Price codes: A06 in paper copy, A01 in microfiche. Report No. FHWA-OR-76-1, 1976. 109 p, 1 fig, 1 tab, 9 ref. 10-2.

Descriptors: *On-site investigations, *Culverts, *Linings, *Corrosion, *Oregon, Surveys, Roads, Highways, Pipes, Construction materials, Corrosion control, Abrasion, Coasts, Brackish water, Metal pipes, Hydraulic structures, Deterioration, Steel, Aluminum, Coatings, Bituminous material, Asbestos-bonded coating, Corrugated metal.

A field investigation of 33 highway culvert instal-lations was made in December 1975 and January 1976 to evaluate the service life of corrugated metal culverts on coastal highways, with emphasis on the durability of the asbestos-bonded protective treatment in marine and brackish water. Metal culverts also were studied. The survey was limited to visual examination and qualitative appraisal of the conditions noted writnessly to decembe a serthe conditions noted, primarily to document per-formance to date and to collect data for future study and monitoring. No attempt was made to quantify metal loss. The report included the indi-vidual inspection records and some photos. (Hum-phreys-ISWS) W79-02870

EVALUATION OF THE CORROSION RESISTANCE OF ALTERNATE REVETMENT WIRE FABRIC MATERIALS IN THE LOWER MISSISPIPI RIVER,

Construction Engineering Research Lab., Champaign, IL. E. P. Cox, and C. G. Chen.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A043 558, Price codes: A04 in paper copy, A01 in microfiche. Report CERL-TR-M-221, July 1977. 62 p. 30 fig, 23 tab, 10 ref, 1 append.

Descriptors: *Retaining walls, *Steel, *Corrosion, *Corrosion control, Evaluation, On-site investigations, Laboratory tests, Stainless steel, Reinforcing steel, Concrete, Reinforced concrete, Coatings, protective coatings, Materials, Materials testing, Civil engineering, Revetment mattresses, Wire fabric materials, Corrosion resistance, Bimetallics, Organically coated steels. Organically coated steels.

This report presented the results of a study of the corrosion resistance and strength of alternate fabric materials for use in articulated concrete revetment mattresses to be placed on the lower banks of the Mississippi River. Three groups of materials—stainless steels, bimetallics, and organically coated low-carbon steels—were evaluated based on short-term electrochemical laboratory tests, laboratory sensitization evaluations, and exposures of up to approximately 4 years in freshwater and 15 months in brackish water. (Sims-ISWS) W79-02872

8H. Rapid Excavation

REVIEW AND ANALYSIS OF BLASTING AND VIBRATIONS AT BANKHEAD LOCK, Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab. R. J. Lutton.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 735. Price codes: A05 in paper copy, A01 in microfiche. Technical Report S-76-6, June 1976. 81 p. 30 fig,

Descriptors: *Excavation, *Alabama, *Rock excavation, *Vibrations, Canal construction, Locks, Channels, Explosives, Rocks, Geology, Hazards, Data processing, Engineering, Civil engineering, *Bankhead Lock(AL).

The Army Corps of Engineers recently replaced the old Bankhead Lock on the Black Warrior River, Alabama, with a larger lock. The new lock required an approach canal excavated by the re-moval of more than 5 million cu yd of rock. Preliminary test shots and an exploratory excavation contract of 0.35 million cu yd established blasting and monitoring techniques that assured that vibration and settlement of the old lock would blasting and monitoring techniques that assured that vibration and settlement of the old lock would not be excessive. Shots were monitored with particle velocity pickups on and adjacent to the lock. A relationship between peak particle velocity and scaled distance was checked on the basis of these data after normalization for structure behavior, coupling, and transmissivity. Recommendations from the test shot program were used in specifications for the exploratory excavation contract. The exploratory excavation, with about 50 presplit and production shots, served as a second testing program for refining the previous observations and conclusions, according to various blasthole arrays and time delays. A principal product of this work was a refined criterion for no-damage to be used in the main excavation contract. The experience gained in preliminary work allowed for more realistic and lower unit-price bids on the main contract. During the main contract, involving the excavation of 5 million cu yd of rock, about 1,000 shots were fired on 9 working levels. Analyses of data generated on this project revealed the effects of 3 factors: delay, confinement, and, to a lesser degree, explosive type. A log normal distribution of peak particle velocities was indicated by analy-

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Field 8-FNGINEERING WORKS

Group 8H-Rapid Excavation

ses of data from large groups of presplit and production shots. The distribution model is proposed for use in predicting ground vibrations at specific scaled distances. (Sims-ISWS) W79-02701

81. Fisheries Engineering

EFFECTS OF REDUCED NIGHTTIME FLOW ON UPSTREAM MIGRATION OF ADULT CHI-NOOK SALMON AND STEELHEAD TROUT IN THE LOWER SNAKE RIVER,

Idaho Univ., Moscow. Water Resources Research

K. M. McMaster, R. G. White, R. R. Ringe, and T. C. Biornn.

C. Bjornn.
Completion Report, Contribution No. 93, Idaho
Forest, Wildlife and Range Experiment Station,
July 1977. 64 p. 19 fig. 10 tab. ref. 3 append. Army,
Corps of Engineers, DACW8-76-C-0016.

Descriptors: *Instream flow *Fish migration. Descriptors: "Instream How, "Pish migration, "Chinook salmon, "Steelhead trout, Powerplants, "Idaho, "Fish passages, Lower Snake River(Ida), Lower Monumental Dam(Ida), Little Goose Dam(Ida)

During 1975 and 1976, an assessment was made of During 1975 and 1976, an assessment was made of the effects of reduced nighttime flows on the up-stream migration of adult chinook salmon and steelhead trout. During the summer and fall, reduc-ing discharge from the dams to zero at night (2300-0700 hours) had no observable effect on migration of adult fish. During the first phase of the study (July-October 1975), radio telemetry was used and mark-recapture techniques to evaluate chinook and steelhead movement patterns and travel rates steelhead movement patterns and travel rates during the periods of uncontrolled and reduced during the periods of uncontrolled and reduced for 8 hours each night on a 7-day rotating schedule of 0 and 10,000 cfs. No differences were observed in behavior or rates of travel of radio- or magnetictagged chinook or steelhead which could be attrib-uted to nighttime flow regimes tested. Seventy-five percent of all steelhead tagged passed through the study area during flow tests. The second phase of the study was an evaluation of 1976 chinook and steelhead passage over lower Snake River dams (using fish counts). This passage was associated (using fish counts). This passage was associated with nighttime flows of 0 and 20,000 cfs. on a 2-day alternating schedule. Using analysis of variance and Wilcoxon's signed-ranks test, no significant differences (.05 level) in counts of chinook or steelhead between the two nighttime test flow conditions were found, thus substantiating the 1975 findings W79-02919

PHYSIOLOGICAL EFFECTS OF ELECTRO-FISHING ON LARGEMOUTH BASS,

Northwestern State Univ. of Louisiana, Natchitoches. Dept. of Biological Sciences. For primary bibliographic entry see Field 5C. W79-02968

LETHALITY OF ELECTROSHOCK TO TWO FRESHWATER FISHES,

Wyoming Game and Fish Dept., Casper. For primary bibliographic entry see Field 5C. W79-02969

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

WATER RESOURCES RESEARCH SUPPORT PROGRAM 1978-1979,

Department of Fisheries and Environment, Ottawa (Ontario). Inland Waters Directorate. For primary bibliographic entry see Field 6E.

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

SELECTED IRRIGATION RETURN FLOW OUALITY ABSTRACTS 1976, SIXTH ANNUAL

QUALITY ABSTRACTS 1976, SIXTH ANNUAL ISSUE, Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering. G. V. Skogerboe, S. W. Smith, and W. R. Walker. Available from the National Technical Information Service, Springfield, VA 22161 as PB-280 925, Price codes: Al4 in paper copy, A01 in microfiche Publication No EPA-600/2-78-042, March, 1978. 311 p.

Descriptors: Fertilizers, Irrigated land, *Salinity, *Return flow, *Bibliographies, Abstracts.

Research related to the quality of irrigation return flow is being conducted at numerous institutions throughout the western United States. Related throughout the western United States. Related work is also underway at other institutions in the United States, as well as other portions of the world. Approximately 100 sources of material have been searched for articles pertinent to the National Irrigation Return Flow Research and Development Program. These articles describe water quality problems resulting from irrigated agricul-ture, potential technological solutions for controlling return flows, recent research pertinent to ling return flows, recent research pertinent to return flow investigations, and literature associated with institutional constraints in irrigation return flow quality control. The first annual issue of Selected Irrigation Return Flow Quality Abstracts covered publications printed in 1968 and 1969, while the second annual issue lists publications printed in 1970 and 1971, the third annual issue covers calendar years 1972 and 1973, and the Courth and 60th assual issue covers calendar years 1972 and 1973, and the fourth and fifth annual issues cover literature pubfourth and fifth annual issues cover literature pub-lished in 1974 and 1975. This annual issue lists publications printed in 1976. This report was sub-mitted in fulfillment of Grant Number R-800426 under the sponsorship of the Office of Research and Development, Environmental Protection Agency. (Skogerboe-Colorado State)

THE USE OF POTASSIUM PERMANGANATE (KMNO4) IN FISHERIES; A LITERATURE

REVIEW,
Fish and Wildlife Service, Fayetteville, AR. South
Central Reservoir Investigations.
For primary bibliographic entry see Field 5G.
W79-02585

WATER CONSERVATION INFORMATION DISSEMINATION DURING THE 1977 DROUGHT EMERGENCY, Utah Center for Water Resources Research, For primary bibliographic entry see Field 3B.

10D. Specialized Information Center Services

DESALINATION TECHNOLOGY TRANSFER CENTER,

Fairleigh Dickinson Univ., Teaneck, NJ. Coll. of Science and Engineering.
For primary bibliographic entry see Field 3A. W79-02840

WATER CONSERVATION INFORMATION DISSEMINATION DURING THE 1977 DROUGHT EMERGENCY,

Utah Center for Water Resources Research, Logan or primary bibliographic entry see Field 3B. W79-02904

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monetes Pugio (Holthuis), W79-02786 5C	W79-02506 5D	Lower Cook Inlet, Volume VI: Food Habits of Shrimp in Kachemak Bay, Alaska,
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1	National Water Well Association, Water Well Construction Technology	W79-03000 one dimensul notice in Administration	1 isnoljak Atroap
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